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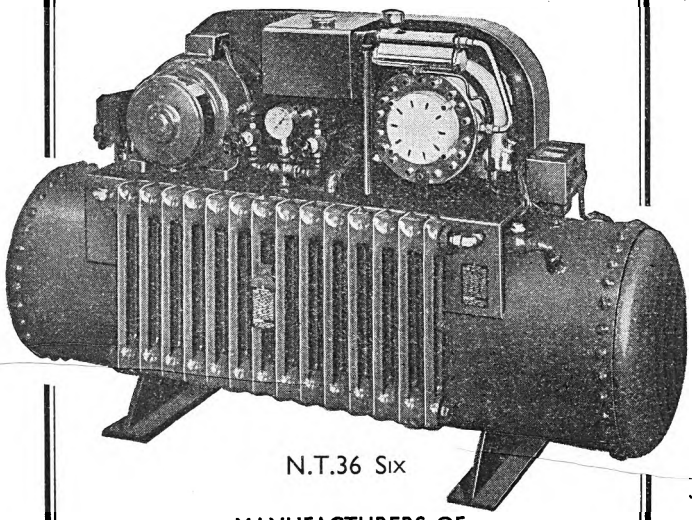

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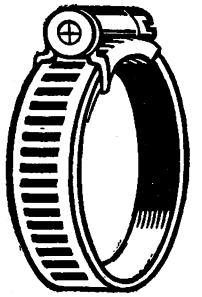

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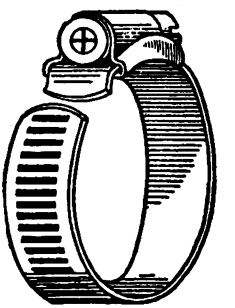

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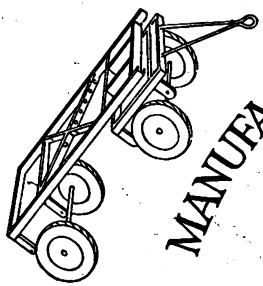

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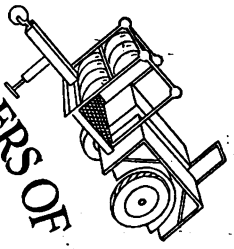

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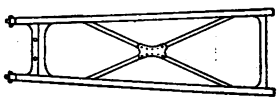

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THE WAR OFFICE

TANK TRAINING

Volume II—Part II

SYSTEM OF GUNNERY TRAINING AND RANGE PRACTICES

1936

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TANK TRAINING

Volume II.—Part II

1936

SYSTEM OF GUNNERY TRAINING AND RANGE PRACTICES

1. General

1. This manual lays down the principles to be observed and the procedure to be followed in the teaching of the recruit, and the exercising of the trained soldier, in the practical handling and shooting of the weapons with which the Royal Tank Corps is armed.

2. The purposes of gunnery training are :—

i. To ensure that officers and N.C.Os. are capable of instructing their men in peace and in war.

ii. To teach officers, N.C.Os. and men the capabilities of the weapons with which their corps is armed.

iii. To render the individual proficient in the use of these weapons and to give him confidence in their power and accuracy in battle.

iv. To practise officers and N.C.Os. in the control of their crews in battle, and to train all members of the crew to work together as a team.

3. Organization is the keynote of efficiency in training. Many unavoidable factors, *e.g.* drafting, transfers, furlough, and garrison and regimental duties, tend to interfere with training, particularly during the individual training season. The majority of these can, however, be foreseen ; but the difficulties to which they give rise will not be overcome, and thus it will not be possible to ensure that every N.C.O. and man receives adequate training in all subjects, unless the most economical use is made of both the time and the training appliances available.

It is therefore essential that training be carefully organized on systematic lines. With this end in view, programmes of

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training must be worked out in detail in ample time and, once decided on, must be adhered to as closely as circumstances permit.

4. The responsibility for training rests primarily with the commanding officer, who will issue the general training programme, which includes the allocation of training equipment and instructors.

The centralization of individual gunnery training under battalion arrangement ensures :—

i. Uniformity of instruction.

ii. Economy in the use of instructors and equipment.

iii. That no individual is missed.

iv. That only qualified instructors are employed.

This system will invariably be adopted.

5. With the above objects in view, commanders should make the fullest use of officers and N.C.Os. who have qualified at instructors' courses at the Tank Gunnery School, or Royal Tank Corps School, Ahmednagar, not only to train their men but also to train additional instructors within their units and to ensure that instruction in units is kept up to date. It is, therefore, desirable that vacancies allotted for courses at the schools should be filled at all times.

6. While efficiency in tank gunnery depends mainly on individual skill, which is in turn dependent on constant practice for its attainment, the opportunities for carrying out such practice with live shell and S.A.A. from a moving vehicle are, for a number of reasons, greatly restricted.

The means by which it is sought to minimize the effect of this restriction are the pellet range for the training in the use of all guns, and the 30-yards range for the training in the use of the ·303-in. Vickers machine gun, while the crew control ranges, even of the most elementary type, provide a means of exercising a crew as a whole under its tank commander.

With the exception of the 30-yards range, the use of which is governed by the amount of ammunition provided in annual allotments, there is little or no restriction on the use of these appliances, and it is of the utmost importance that commanders should regard the instruction and the various practices which are carried out with their aid not as annual stages of training to be completed in a set time, but as the only available means of ensuring the constant practice for which the need is emphasized above. Consequently, they should be used throughout the year, special importance being attached to pellet range training.

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Efforts should be made to foster keenness by organizing inter-company, section and crew competitions, while the formation of unit clubs with " pool " events to be competed for out of normal working hours is of undoubted value.

7. No amount of gunnery training will produce its best results unless the gunners continually handle their weapons. Consequently, when an armoured fighting vehicle is on the move, frequent opportunity should be taken by the Tank commander to practise the gunners in laying on different targets, and estimating speed and ranges.

This necessitates that the full equipment, both of weapons and means of internal communication, should at all times be maintained.

2. System of training at the Tank Gunnery School

The objects of the Tank Gunnery School are :—

i. To train officers and N.C.Os. from Regular and Territorial Army units to act as instructors in their units.

ii. To train recruits of the Royal Tank Corps, and young officers both of the Regular Army and of the Supplementary Reserve of Officers, up to the standard of a trained soldier, Royal Tank Corps.

iii. To study training methods and gunnery technique with a view to ensuring a uniform system of gunnery instruction throughout the Royal Tank Corps as a whole.

iv. To carry out demonstrations, and to conduct special courses for senior officers, with a view to keeping the Army as a whole in touch with the latest developments in tank gunnery and fire tactics.

These objects are attained by carrying out courses during the year. The general scope of these courses is given in the pamphlet Courses of Instruction.

3. Recruits' gunnery training (Regular Army)

1. The gunnery training carried out by the recruit at the Tank Gunnery School will be as follows :—

i. 3-pr. gun, Mark II.

(*a*) Mechanical training.
(*b*) Elementary gun drill.
(*c*) Pellet range training (Table I).
(*d*) Sub-calibre practices (Table IV).
(*e*) Firing shell from a moving tank.

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ii. ·303-in. Vickers machine gun.
  (*a*) Mechanical training.
  (*b*) Elementary gun drill.
  (*c*) Firing practice on a short range from an oscillating platform (Table II).
  (*d*) Firing practice at known ranges from a moving tank (Tables III and V).

iii. Crew drill.

iv. Eye training.
  (*a*) Judging distance.
  (*b*) Judging speeds of armoured fighting vehicles.
  (*c*) Judging courses of armoured fighting vehicles.

v. Tests of elementary training. *See* Sec. **7.**

2. Elementary training in the use of the ·303-in. rifle and ·38-in. pistol, including handling, drill and short-range firing, is carried out at the Royal Tank Corps Depot.

4. Annual gunnery training, Royal Tank Corps (Regular Army)

1. The annual gunnery training of officers and other ranks in battalions, Royal Tank Corps, will be as follows :—

i. (*a*) Mechanical training (all weapons).
  (*b*) Gun drill (all weapons).
  (*c*) Table I (pellet range).
  (*d*) Table II (30-yards range machine gun).
  (*e*) Table III (open range machine gun).
  (*f*) Table IV. (Single shot machine gun practices from a moving armoured fighting vehicle at short range, approximately 150 yards. To be fired from the co-axial gun of medium tanks and by light tanks and Lanchester armoured cars as a sub-calibre practice to represent the use of a single shot gun or heavy machine gun firing very short bursts. In the case of the 3-pounder gunners this practice forms a link between Tables I and V.)
  (*g*) Table V. (Firing shell, and including one or more practices in which co-axial machine gun and 3-pr. are both used.)
  (*h*) Battle practices—Individual and collective.

ii. Pistol.
  (*a*) Handling.
  (*b*) Drill.
  (*c*) Firing practice ·38-in. calibre (annual pistol course as laid down in Small Arms Training, Vol. IV).

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iii. Crew drill and fire orders.
iv. Eye training.
  (*a*) Judging distance.
  (*b*) Judging speeds of armoured fighting vehicles.
  (*c*) Judging courses of armoured fighting vehicles.
  (*d*) Study of ground.
v. Tests of elementary training.

2. The following exceptions will apply to the detail above.
  i. Field officers, except company commanders, will fire the pistol course only. Company commanders will fire all the tables except Table V and should act as Tank commanders during an individual battle practice run.
  ii. Adjutants and technical officers will fire the pistol course only.
  iii. Warrant officers, and employed men specified in Peace Establishments, will fire all tables except Table V.
  iv. Tradesmen (other than drivers I.C.E.) and the clerical section, R.T.C., will fire the pistol course, Table II, and Table III (C) only.

5. Recruits' gunnery training (Territorial Army)

The gunnery training of a recruit in an armoured car company, Royal Tank Corps (T.A.), will be as follows :—

i. ·303-in. machine gun.
  (*a*) Elementary mechanical training.
  (*b*) Elementary gun drill.
  (*c*) Firing short-range practices (Table VII).
  (*d*) Firing at known ranges from a moving car (Table VIII).
ii. Crew drill and fire orders.
iii. Eye training.
iv. Tests of elementary training.

6. Annual gunnery training (Territorial Army)

i. ·303-inch machine gun.
  (*a*) Mechanical training.
  (*b*) Gun drill.
  (*c*) Firing short-range practices (Table VII).
  (*d*) Firing at known ranges from a moving armoured car. (Table IX.)
  (*e*) Battle practice at unknown ranges.

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ii. Pistol.
(*a*) Handling.
(*b*) Drill.
(*c*) Firing practice.
iii. Eye training.
Judging distance and estimating speeds of vehicles.
iv. Crew drill and fire orders.
v. Tests of elementary training.

7. Tests of elementary training

1. Tests of elementary training afford company, etc., commanders a means of examining the personnel under their command, with a view to ascertaining whether they have maintained a satisfactory standard of efficiency in the various subjects in which they have been instructed. These tests should be carried out by all personnel annually before they fire open range practices.

The tests will also be used to examine recruits during the later stages of elementary training at the Tank Gunnery School.

So much ground has to be covered by units during the individual training season that, in order to take full advantage of the time available, the tests laid down below should, as far as possible, be conducted concurrently with instruction.

It is not possible to lay down detailed procedure for carrying out these tests. The main principle to be observed, however, is that on no account should a whole crew or squad be kept in idleness while one member of it only is being tested.

The passing of tests of elementary training must not be considered as a necessary qualification for beginning pellet range and short range (30-yards) practices.

These should be spread over the whole period of time devoted to instruction in weapons and drill.

In order to ensure that all ranks are tested annually, a record should be kept by the company, etc., commander. A specimen record sheet is given as a guide in Appendix I.

2. The tests are divided into :—

Oral tests.
Standard tests.
Tests in judging distance, speeds, courses and aiming off.

i. Oral tests (all weapons).—Oral tests are designed to examine personnel in general knowledge of guns, spares, ammunition and the care and preservation of arms not specifically dealt with in the standard tests.

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Questions for oral tests should be so framed as to ensure that answers disclose a reasoned understanding of the subject rather than a parrot-like knowledge.

A few questions should be put to each man on :—

(*a*) The care of weapons, their ammunition and spares.

(*b*) His general knowledge of the weapons.

A selection of typical questions is given in Appendix II.

It is emphasized that this list is by no means exhaustive and is only given here as a guide, in order to indicate the type of question suitable for inclusion in oral tests.

ii. Standard tests are designed to examine the individual's ability in practical handling. When possible, advantage should be taken of the opportunity to carry out the test in the form of a competition.

The following are the standard tests which a trained soldier should be required to pass :—

A. 3-pr. guns, Marks I and II, and 3·7-inch howitzer.

(*a*) Stripping :—

Remove and replace the breech block from the gun.
Strip and assemble the firing mechanism—including the changing of the firing pin.

(*b*) Repairs and adjustments :—

Test and adjust the sights and firing mechanism.
Both tests to include the co-axial gun.

(*c*) Loading :—

Mark I gun—10 rounds to be loaded in 45 seconds.
Mark II gun—10 rounds to be loaded in 55 seconds.
3·7-inch howitzer—5 rounds to be loaded in 40 seconds.

Method of conducting the test :—The time of loading each round will be checked separately. The waiting interval between rounds will not be timed. The test may be carried out in a tank or on a drill mounting. In the latter case the drill rounds should be distributed to simulate stowage in racks. The breach will be closed, the belt box of the co-axial gun will be in the carrier and the lid open. On the command "**Action**" the co-axial gun will first be loaded, then the 3-pr. gun or 3·7-inch howitzer. The time for the first round will be taken from the command "**Action**" to the gunner being tapped on the arm. For subsequent rounds the time will be taken from the release of the firing mechanism to the

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gunner being tapped. Normally the instructor who acts as gunner and checks the time of each round on a stop-watch should not release the firing mechanism until the loader has resumed the alert position beside the gun with the next round ready in his hand. When, however, a loader is unnecessarily slow in collecting the next round, the firing mechanism should be released and the time taken. During the loading of the shell the instructor should give the order "**3-pounder Stop, Co-ax. Go-on**" and change over to co-ax. One or two simple stoppages on the co-axial gun may then be given, *e.g.* the gun is already set up for a No. 4 and "Gun Stops" followed if necessary by "Gun won't fire" is sufficient to make the loader carry out the appropriate I.A. A bulged round may be included in the belt to cause a stoppage in reloading. The instructor then gives the order "**Co-ax. Stop, 3-pounder Go on**" and changes to 3-pounder. When the tenth round has been loaded, the total time will be read on the stop-watch.

Note.—The object of this test is to ensure alertness and quick action on the part of the loader, and the change over to co-axial gun is introduced to distract the loader's attention from the mechanical loading of shell. It is therefore useless unless it is done in such a way as to increase the alertness of the loader. In the case of the 3·7-inch howitzer the time taken should include the removal of the cap, which should therefore be fitted before the test begins. The securing wire, represented by a piece of cord in the drill round, should be removed beforehand.

(*d*) Sight setting.—Standard required :—

Sights set to the correct range three times. Five seconds allowed for each setting. Permissible error —50 yards.

Method of conducting.—A telescope will be fitted to the gun. The individual to be tested will assume the alert position of the firer. The range drum will be set at 1,000 yards and the eye will be at the telescope throughout the test. The instructor will hold a stop-watch and take the time from the last syllable of the word "hundred" to the firer removing his hand from the adjusting wheel. The change of range for each test must not exceed 500 yards.

B. Vickers machine guns.

(*a*) Removing and replacing the gun and accessories from the mounting.
(*b*) Stripping and assembling the gun.
(*c*) Stripping and assembling the lock.
(*d*) Renewal of packings—gland and cannelure.

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(*e*) Weighing and adjusting the recoiling portions.
(*f*) Weighing and adjusting the fuzee spring.
(*g*) Removing the empty box from the carrier, placing the filled belt and box in the carrier, loading the gun and assuming the correct firing position. Time allowed :—

·303-inch V.M.G.—Light tank	.. ..	30 seconds.
Medium tank—		
Hull V.M.G.	.. ..	20 seconds.
Co-ax. V.M.G.	.. ..	20 seconds.
Rolls Royce A.C.	.. ..	20 seconds.
·5-inch V.M.G.—Light tank	.. ..	30 seconds.

Method of conducting.—The individual to be tested will be in the correct firing position, the filled belt and box will be in the nearest spare box carrier. On a given signal the empty box will be removed from the carrier by the gun and a filled belt and box put in. The gun will then be loaded and the correct firing position assumed. The time will be measured from a signal to begin to the correct firing position being assumed.

(*h*) Unloading.—The gun will be loaded and the firer in correct firing position. Time allowed :—

All guns	4 seconds.

Method of conducting the test.—The time will be measured from the time the command "**Unload**" is given to the belt being eased from the feed block.

(*i*) Spare parts—Checking spares and packing in their respective containers.
(*j*) Immediate action—A test consisting of three difficult stoppages. A suggested method of conducting the test in the nature of a competition is given in Appendix IV.
(*k*) Belt filling—One complete belt to be correctly filled either ·5 or ·303 inch. It is essential that live ammunition and a belt in good condition be used for this test.

C. Gun drills.

Carry out **Armament Inspection** on all weapons.

D. Pistol.

As laid down in Small Arms Training, Vol. I.

Note.—In the above tests, although there may be no time limit, a man who fails to complete the test in a reasonable time should not be passed.

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iii. Tests in judging distances, speeds, courses and aiming off.—The guiding principles on which training in these subjects should be carried out are laid down in Tank Training, Vol. I and Vol. II, Part I.

Owing to the wide dissimilarity in the ground available at different unit stations, it is not possible to lay down definite instructions for carrying out these tests. It must therefore be left to the individual judgment of commanders to decide the details of methods to be adopted.

Since, however, it is desirable to consider the factors of range, speed and direction together in terms of aim-off, the tests should be carried out conjointly.

A preliminary indoor test of aim-off should be carried out by means of the twin telescope holder, the individual being required to set three correct aims out of four problems given by the instructor. This should be followed by an outdoor test in which the individual will be required to give, in terms of aim-off, the correct solution to a series of problems presented by actual tanks, moving in the open at varying ranges and directions.

The ability to judge speed, lateral distance and correct angles is of the greatest importance to commanders and gunners of close support tanks. Unless this is thoroughly practised and understood by all ranks, the covering of tank formations which are not in the immediate vicinity of the close support tank will be ineffective.

Note.—The time limit in the above tests is only included to encourage quick handling. It should be borne in mind that, although rapidity is necessary, accuracy is the first essential. The tests must be carried out in strict accordance with the detailed instructions given, as otherwise the time factor becomes inapplicable.

8. Standards of gunnery training

1. Owing to the limited amount of shell available it is impossible to train more than a small proportion of a unit with shell every year. In order, therefore, to ensure that as large as possible a proportion of the reserve are trained gunners, 75 per cent. of those who fire shell each year should be men who have not previously fired shell except as recruits. Up to 10 per cent. of officers below field rank and serjeants may be included among those firing shell each year. All officers and N.C.Os.

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attending armament instructors' courses at Lulworth will fire the whole of Table V.

2. While the general proficiency of the company or section as a unit will be indicated by results achieved in battle practice, the skill of the individual will be judged by the following tests and exercises :—

The standard required of a qualified gunner, Royal Tank Corps, is shown below.

A record showing the standard reached by every N.C.O. and man should be kept by the company commander. A specimen record sheet for this purpose is shown in Appendix I.

i. Regular Army.

(*a*) Passed tests of elementary training laid down in Sec. **7.**
(*b*) Qualified in Table I.
(*c*) Qualified in Table II.
(*d*) Qualified in Table III.
(*e*) Exercised in Table IV.
(*f*) Qualified in Table V. (Units equipped with medium tanks).
(*g*) Pistol.—Qualified in the annual pistol course as laid down in Small Arms Training, Vol. IV.
(*h*) Exercised in battle practice.
(*i*) Qualified in judging distances and exercised in estimating speeds and courses of armoured fighting vehicles.
(*j*) Exercised in crew drill and fire orders.

ii. Territorial Army.

(*a*) Passed tests of elementary training ·303-inch Vickers machine gun.
(*b*) Exercised in Tables VII and VIII or IX and in battle practice.
(*c*) Exercised in crew drill and fire orders.

9. Allotment of ·303-in. ammunition (Regular Army)

	C.O.'s pool	*Table II*	*Open range including battle practice*	*Table IV*	*Total*
Recruits . .	20	390	355	40	805
Trained soldiers .	–	185	605	40	830

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10. Allotment of ·303-in. ammunition (Territorial Army)

	C.O.'s pool	Table VII	Table VIII	Table IX	Repetition and practice	Total
Recruits . .	20	137	70	–	43	270
Trained soldiers .	–	79	–	105	66	250

11. Allotment of shell (Regular Army)

1.	Table V	Battle practice
Recruits, a man – – –	5	–
Trained soldiers. 69 gunners a battalion . . .	2070	360*

2. *Allotment of smoke shell (Regular Army)*

Trained soldiers . . . 420 rounds a battalion.

12. Pellet range training

1. The primary object of pellet range training is to bring the individual, by progressive stages, to a standard of efficiency that will justify his further training on the open ranges. It is emphasized, however, that, since efficiency in tank gunnery can only result from long and constant practice, the practices also provide a means of ensuring that the experienced gunner not only maintains but steadily improves in efficiency.

It should be realized that the full value of pellet range training will not be obtained unless all gunners, actual or potential, are given frequent opportunity for practice throughout the year.

2. The detail of practices to be fired is given in Table I.

These practices are framed in such a way as to enable them to be carried out in varying and progressive stages of difficulty, according to the state of training of those under instruction, and also with equipment in different stages of development.

It is important to realize, however, that the more closely conditions in the pellet range can be made to approximate to those experienced in a moving armoured fighting vehicle on the open ranges, the greater will be the value obtained from this form of training, but instructors should remember that conditions can never be exactly the same.

Although the movement obtained on a rypa is not the same as that experienced in an armoured fighting vehicle, it is

* Ammunition required for A.R.A. will be taken from the battle practice allotment.

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sufficient to train a gunner to control the gun instinctively against any movement.

In practices where aiming up or down and alteration of range are taught it should be remembered that the relation between aiming up or down in the telescope and altering the range drum is only correct at one point of the pellet range. Trial will show that aiming up nine minutes in the telescope (approximately equal to 100 yards) will make less difference at short range on the pellet range than it does at longer ranges. On the open range the effect is of course the opposite.

13. 30-yards range training

1. The object of training on the 30-yards range is to enable the soldier to acquire a standard of efficiency in the handling and control of his gun and mounting that will warrant his undergoing further training from an armoured fighting vehicle, and to enable the trained soldier to maintain his standard of efficiency.

It is a waste of mileage and ammunition to permit a soldier to fire practices from a moving armoured fighting vehicle on the open range until he has first been thoroughly grounded in the correct firing position, and in the correct holding, control and sighting of the weapon. In addition, he must have attained the requisite skill in correctly remedying stoppages.

2. When 30-yards ranges are near barracks, they can be made use of at any time of the year. The bulk of this training should be carried out during the individual training period, and it is important that the 30-yards range practices should be spread over the whole period of elementary ·303-inch Vickers machine gun training.

14. Table III. Open range machine-gun practices

1. In all cases qualification will be by shot hole counting on a large screen target. The types of target in use are :—

i. 8 ft. by 8 ft. screens, white with a black border 1 ft. wide. These may be used singly or in pairs to form a 16 ft. by 8 ft. screen.

ii. Tank shaped and tank sized black screens used for moving target practices, or a black screen 12 ft. by 6 ft. representing transport on the move.

A description of the methods of constructing and operating these targets is given in Appendix III.

2. The object of these practices fired at large screens is to train and test the firer in manipulating the gun under known

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conditions of range and aim off. It is not practicable for the firer with the limited amount of ammunition available to correct his fire from observation in all practices. Before these practices have begun the machine guns should therefore be very carefully tested by firing and, when possible, the sights should be accurately adjusted for range and for deflection. If the sights for any reason cannot be accurately adjusted, the error should be noted and this error should be explained to each firer. The result of these practices will then be a proof of the ability of the individual firer to take and maintain a correct aim whilst firing.

The following method of testing sights is recommended.

i. Test and adjust the sights as explained in Tank Training, Vol. II, Part III.

ii. At a known range, say 500 or 600 yards, fire from the stationary tank a group of three or four single shots at an 8 ft. by 8 ft. screen.

iii. If the group appears on the target, but not at the point of aim, then without moving the gun, adjust the telescope until the cross-wires are on the point where the shots were grouped. The gun and telescope will now be correctly aligned.

iv. Check by firing another group of single shots and, if there is still a slight error, it may be taken up by repeating iii, above. If the first group does not appear in the target, it may be necessary to observe the strike of the bullets with glasses in order to find out in which direction the error is, or to aim first to one side of the target and then to the other until a group is obtained somewhere on the target. Then repeat as in iii, above.

This method of testing and adjusting sights may be used for all types of tank gun. In the case of the 2 or 3-pr. a slightly longer range is advisable, say 700 or 800 yards, and only one round need be fired instead of each group of single shots in the case of the machine gun.

In firing flat-headed shot, the following preliminary adjustment should be made before testing by firing.

Test and adjust in the normal way, then turn the range cam until the scale reads 950 yards. Without altering the cam loosen the skin of the range drum and turn it back to read 800 yards. Tighten the securing screws. This compensates for the fact that flat-headed shot loses its velocity more quickly than service shell, and gives a reading on the range scale approximately correct for all ranges from 500 yards to 1,200 yards.

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Early marks of light tank have no means of adjusting the telescope in the mounting and any error found in testing must therefore be noted by each firer. In the case of the co-axial machine gun mounted in medium tanks IA and II, although the telescope and range skin can be adjusted accurately for either the 3-pr. or co-axial machine gun, there is no lateral adjustment between the 3-pr. and the machine gun.

It may therefore be impossible to correct for deflection on both guns. If only one gun is being used in the practice, correct for that gun, otherwise correct for the 3-pr. and note the error in the co-axial gun.

In all cases when the means of adjustment makes it possible the range scale, after final adjustment, should read the actual range at which the gun is being tested.

3. In addition to these practices in which shot holes are counted on large screen targets, it is desirable to train a gunner to fire at less conspicuous targets and at ranges which are not accurately known, in order to teach him to pick up such targets quickly, to estimate the range and to observe his fire and correct as necessary. In such practices it is not so essential that the sights be accurately adjusted. In fact, where correction from observation is the main lesson of the practice, it may be desirable to set the sights out of adjustment. In all cases the instructor or officer or N.C.O. conducting the practices should know the amount of the error, and the firer should be told the fact that there is an error.

A small aiming mark or any of the machine gun targets described in Appendix III may be used.

15. Table IV. Sub-calibre practices

This is a short range instructional table suitable for all types of armoured fighting vehicles. It is fired as a single shot machine gun practice with observing ammunition and a steel plate as a target. (*See* Appendix III.)

When the bullet strikes the steel plate at short range, it gives an unmistakable flash which indicates a hit to the instructor and to the firer. It therefore eliminates the necessity, and consequent delay, of checking targets between details, and so enables a maximum amount of firing in a minimum of time.

The practices are fired at a range of about 150 yards.

The plate target should be approximately 1/5 tank size and is therefore equivalent to a medium tank at 750 yards. The target should be placed on a butt or forward slope with an area of three or four feet of loose gravelly soil all round it.

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The object of this background is to ensure " observation " of the strike of such bullets as do not strike the plate. If the soil is loose, a spurt of sand will usually give some observation, and if there is a good deal of gravel in it, it will be hard enough to break the envelope and cause a puff of smoke from most of the bullets.

A firer who observes carefully should be able to see at least 90 per cent. of the bullets which do not strike the target. If the range is increased, observation of the shots which miss becomes very difficult and most of the value of the practices will be lost.

When fired from the co-axial gun of a medium tank, these practices may be considered as sub-calibre practices and they form a link between Table I and Table V. However well equipped a pellet range may be, the conditions can never be quite the same as in a tank; this sub-calibre table is therefore an essential preliminary to Table V for all medium gunners.

As light tanks and armoured cars may be equipped with a heavy machine gun or single shot weapon for anti-tank work, it is important to train all light tank or armoured car gunners in firing such a weapon.

When observing ammunition is available for these weapons and the weapons are issued, similar practices to these may be fired at longer range, but until such time ·303-inch ammunition at short range provides an excellent means of training a gunner to fire quickly and accurately from a moving armoured fighting vehicle and to correct from observation.

In all cases it is essential to adjust the sights accurately at the actual range.

If it is desired to teach a firer to " aim off " or use a selected point other than the intersection of the crosswires, then the range and deflection (if any) may be set off, but the instructor must know what the error is.

16. Table V—2 or 3-pr. and co-axial machine gun

This table is primarily a 3-pr. table but in order to accustom the gunner to the change-over from co-axial to 3-pr. and vice versa one practice is included in which the co-axial machine gun is also used.

The targets used in Table V are similar to those used in Table III, and all qualification will be as a result of shot hole counting.

It is essential, therefore, that in this as in all previous tables sights should be accurately tested and adjusted.

This may be done by the method explained in Sec. **14**, 2.

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17. Battle practice

1. These practices are designed to train crews to work as a team under battle conditions, and as a final test of the standard of efficiency in tank gunnery attained by every unit. They are not a test of the skill of individual gunners.

They should be fired by all units first as instructional practices and finally as a test.

The scope of each practice will depend on the time and the ranges available and on the amount of ammunition allotted, but generally speaking there are two types of battle practice.

i. An elementary practice in which one crew only is exercised.

ii. A more advanced practice in which a unit is exercised in collective control.

2. The object of the first type is to train officers and N.C.Os. to direct and control the fire of their crews, including control of the driver. In order, therefore, to make full use of such ammunition and ranges as are available, it is essential that full use should have been made of all other means of training all members of the crew in crew control, including visual training, battle drill, fire orders, etc.

Considerations of safety combined with the restricted areas available for manœuvre on ranges and by units in home stations will usually make it necessary to restrict the tank run to definite narrow limits. A short run of two or three hundred yards with half a dozen targets is sufficient for instruction in elementary stages. Provided that the order in which the targets appear can be varied, it does not matter if the crews know where these targets are. When a crew is already well trained or is being tested, it should be kept in ignorance of the position of all targets.

As the control of machine gun fire is much more difficult than that of shell which gives " observation " to tank commander and gunner, every opportunity should be taken to exercise crews in their elementary battle practices with S.A.A. only. If time permits, it is better to fire two practices with only sufficient ammunition in each to show that each target has been engaged as ordered, rather than to fire one practice only in order to have sufficient ammunition to bring a large volume of fire to bear on the targets.

In a test battle practice sufficient ammunition should be allotted to enable all important targets to be engaged with a heavy volume of fire.

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3. In allotting marks for battle practice, the following points should be considered.

i. Effectiveness or otherwise of fire.
ii. Time taken to obtain effective fire after the target has appeared.
iii. Control of the crew under such headings as :—
(*a*) Correctness of fire orders.
(*b*) Alertness of the tank commander.
(*c*) Alertness of gunners.
(*d*) Control of members of the crew.
(*e*) Tactics, *e.g.* distribution of fire, speed of vehicle, use of ground etc., where applicable.

Fire effect will usually have to be judged by observers with field glasses or in dug-outs near the targets.

Crew control should, if possible, be judged by an officer or trained N.C.O. travelling on the tank and listening in to the orders given by the tank commander.

4. When facilities exist, the crew control practice should be followed by a practice in which two or more tanks are exercised as a unit. The size of the unit that can be exercised and the scope of the practice will depend on the extent of the ranges and the restrictions imposed by safety regulations.

While under the most favourable conditions the unit commander may be required to exercise a certain amount of tactical control, it may often be necessary for reasons of safety to limit very carefully the movements of all tanks, while leaving the unit commander to control the fire of his unit.

Collective fire control may be by plan arranged to suit typical situations or it may be by order as circumstances demand or very often by an intelligent use of both. The practice should therefore give the unit commander an opportunity of dealing with several types of situation, *e.g.*

i. Distribution of fire against conspicuous targets, such as enemy tanks, batteries in the open, transport on the move.
ii. Concentration of fire on one or more of a series of conspicuous targets.
iii. Distribution of fire over an area occupied by inconspicuous targets. The limits of the area may be fairly obvious where a wood, a thick hedge or clumps of gorse provide possible cover ; on the other hand, the unit commander may have difficulty in indicating clearly the limits of the area which he wishes to engage.
iv. Concentration of fire on one or more inconspicuous points.

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The extent to which the practice of collective fire control becomes possible will depend on the development of :—

(*a*) Fire tactics.
(*b*) Methods of external control.
(*c*) Methods of internal control.
(*d*) Range facilities.

Collective control will always be superimposed on tank control, thus necessitating a switch over from one to the other, and therefore, except where unusual range facilities exist, it is probable that only one or two situations requiring collective control can be introduced in each practice.

Types of target suitable for battle practices and methods of operating them are explained in Appendix III.

18. Table VI.—Smoke practices

1. These practices may be divided into three parts, as follows :—

i. Training the individual gunner in screening a formation which is adjacent to the close support tank.
ii. Training the close support tank commander to issue fire orders to his gunner which will screen a formation which is at some distance from the close support tank.
iii. A collective control practice where two or more close support tanks are required to screen a formation at a distance, acting on the wireless orders of the formation commander.

2. Training the individual.

The actual firing of smoke from a howitzer presents no great difficulty to a trained gunner and it may be sufficient to allot only four or five rounds for this purpose, but unless the firer understands the principles of forming a smoke screen and can apply these reasonably well to a known target, it will be a waste of time and ammunition to attempt the combined training of tank commander and gunner. The number of rounds fired by each gunner should therefore depend on :—

i. His previous practical experience.
ii. Whether or not he attains a satisfactory standard in his first practice.

In some cases it may be found necessary to curtail the more advanced practices, allotting the ammunition saved to further elementary practices.

In all smoke practices a great deal can be learned by watching others fire, and the effect of weather conditions, wind, moisture, heat, etc., on the smoke screen can be appreciated as well by those watching as by the gunner himself. In order

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therefore to give as much experience as possible under varying conditions, the smoke practices of a unit should be spread over two or three days and all gunners should be present throughout the practices. A careful selection of targets will often enable advantage to be taken of a variety of atmospheric conditions on the same day.

3. Training tank commanders.

When the gunner has reached the necessary individual standard, the second stage of training, that is, the combined training of tank commander and gunner, will be carried out. The target to be screened will be indicated to the tank commander only, and he will indicate to the gunner by means of an appropriate fire order the area in which the screen is to be formed. As in the elementary practice, targets should be varied so as to give experience of different conditions, and as many as possible should watch the practices.

The following lessons should be brought out :—

i. Accurate estimation of range by the tank commander and gunner.

ii. Immediate firing of a first round.

(*a*) In order to give a point from which to correct, if necessary.

(*b*) In order to find out the strength and direction of the wind.

(*c*) As a check on the estimated range.

iii. Correction by the tank commander from the first round.

iv. Accurate application of that correction by the gunner.

v. The maintenance or extension of the screen.

This may be done in two ways.

(*a*) The tank commander may continue to give correction for each subsequent round. This may be necessary when the gunner does not know the relative positions of the unit which he is screening and the point or area from which he is screening them.

(*b*) The tank commander may describe the exact area which has to be obscured, and give gun control.

vi. Alteration of range.

This is primarily the duty of the gunner and, once the correct range is found, there should be little difficulty for an experienced gunner in keeping it. But, if possible, every gunner should be given one practice in which considerable alteration of range is necessary.

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The correct estimation of lateral distances is an essential part of the training of both the tank commander and gunner.

4. Collective control.

Having trained the individual gunner to produce a smoke screen and the tank commander to apply that screen to the correct point, the next stage is to practise close support tanks in the use of smoke in co-operation with each other and with other units. This is largely a question of intercommunication between the commander of the unit asking for smoke and the commander of the close support tank or section.

The sequence is as follows :—

i. A wireless order from the unit commander to the close support tank commander indicating the area to be screened.

ii. A fire order from the close support tank commander to his gunner.

iii. The first round fired immediately.

iv. Correction by (*a*) the unit commander to the close support tank commander, (*b*) the close support tank commander to the gunner.

The error, if any, may be due to one or more causes, *e.g.* the unit commander may have been unable to indicate clearly where he wanted the screen.

The tank commander may have failed to indicate clearly to the gunner.

The gunner may have been at fault.

The tank commander may have misjudged the relative positions of the unit which he is screening and the enemy.

Whatever the cause, the commander who has asked for smoke should give an immediate correction from the first round. That one correction is the most the close support tank commander can expect, and he must act thereafter on his own initiative.

If wireless is not available as a means of communication, the close support tank must be with the formation which it is screening. Visual signals are not sufficiently accurate to enable fire to be controlled at a distance.

Every effort should therefore be made to practise close support tanks in co-operation with other sections or companies, and at least one practice should be fired to exercise every company commander in conjunction with his own close support section.

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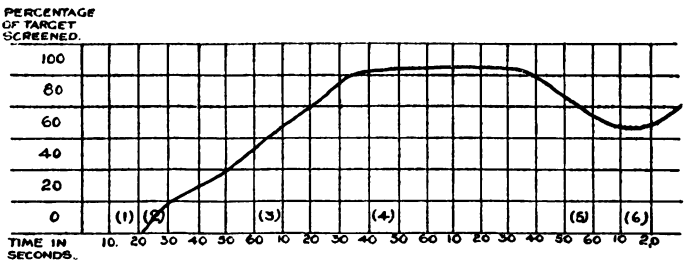
5. The following chart is suitable for marking a smoke shoot.

EXAMPLE OF SMOKE PRACTICE MARKED ON CHART



The time will be taken from the indication of the target to the tank commander or firer. The time of the burst of every shell will be marked at the bottom of the chart by the figures (1), (2) or (3), and so on. The actual effect of the screen will be recorded as a graph on the chart and will show the percentage of the target screened at any moment of the practice.

The graph will show such points as :—

i. Time taken to get first round down.

ii. Time for first (or subsequent) round to become effective.

iii. Time and number of rounds required to get 100 per cent. screen.

iv. Maintenance of maximum screen or failure to maintain it.

It cannot show definitely the fault, if any, of every round, *e.g.* a gap or loss of effect in a screen might be due to either bad timing or bad placing of a shell or shells; nor does it necessarily show whether the best possible result, under the existing conditions of atmosphere, ground and movement, was obtained. *E.g.* while under favourable conditions a small area might be completely screened in a few seconds by the first round, there may be occasions when a firer cannot be expected to obtain 100 per cent. screen even with four or five rounds.

Unless, therefore, the chart is accompanied by an explanatory note, it is only a reliable record to enable the firer to be criticized immediately after firing.

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On the example shown on the chart the following is a probable criticism.

1st round—fired quickly and effective about five seconds after bursting—good.

2nd round—fired as soon as effect of first was seen—increased screen—good.

3rd round—completed screen—good.

4th round—maintained screen at 100 per cent.—good.

5th round—not fired until screen showed signs of losing effect. It would have been well placed if it had been fired earlier, but as it was left so long, it should have been placed to get immediate effect where the screen was becoming thin.

6th round—good. It was fired immediately after 5 and well placed, presumably because the firer realized the mistake of the previous round.

General.—It took 1 minute 40 seconds to get 100 per cent. screen. Could a quicker result have been obtained by placing the first three or four rounds differently or by firing them more quickly ?

The chart does not answer the question, but gives a record of the actual effectiveness of the screen, and the marking officer from his own observation must be able to state the cause of any failure or partial failure.

19. Danger areas

1. Battle practice, and other firing with shell, is at present carried out only on approved tank ranges at home and in Egypt ; consequently it is unnecessary to lay down dimensions and other particulars regarding ranges required for this purpose.

In the event of its being desired to fire shell other than on an approved tank range, at any station at home or abroad, application must first be made to higher authority. Full particulars, including a large-scale map of the whole of the area in which it is desired to carry out firing, must accompany all such applications.

2. The danger area required for carrying out machine gun shooting from armoured fighting vehicles in movement must be large for the following reasons :—

i. There is no stop butt, and consequently nearly every bullet fired will ricochet.

ii. The line of fire is seldom parallel to the axis of the range.

iii. Sudden, and often violent, movements of the vehicle tend to throw the gunner off his aim to an extent for which due allowance must be made.

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3. The danger area required for such a range, and the method of arriving at its dimensions, are shown in Plate I.

4. The depth must be 3,400 yards ; the width required is 250 yards on the outer side of the flank lines of fire at the target and 880 yards on the outer side of these flank lines of fire at 1,400 yards to 3,400 yards, measured from the most advanced firing point.

5. It will be seen that the governing factor is the angle subtended by the flank lines of fire ; this can only be reduced and, consequently, a smaller danger area obtained, by :—

i. Reducing the width of the target area.
ii. Reducing the width of the range (*i.e.* length of broadside run).
iii. Increasing the minimum range at which firing is carried out.

It may be found necessary in some cases to carry out firing by single vehicles only on a very restricted broadside run, at one centrally placed target, and to fire only such moving target practices as provide for the target movement being parallel to, and in the same direction as, the firer's vehicle.

20. Safety precautions for armoured fighting vehicles firing on the open range

1. It is not possible to lay down in detail the safety precautions that will be applicable to all the varying types of ranges and circumstances on and in which armoured fighting vehicles may carry out their gunnery training. The following general instructions are applicable to all armoured fighting vehicles and types of range accommodation, and must be observed.

2. General principles.—The safety of personnel on ranges being used by armoured fighting vehicles depends on :—

i. Strict adherence to crew and section drill.
ii. Strict supervision of angles of fire by the tank commander.
iii. Proper supervision and organization of personnel at the firing point by the superintending officer.
iv. A thorough understanding, by all ranks, of instructions and of such local orders as apply to the range used.
v. The intelligent co-operation of all ranks, who necessarily work in conditions of greater freedom from supervision than is customary in other arms of the service.
vi. The careful organization both of the targets and control arrangements by the range officer and the accurate work of those detailed to operate them.

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3. Armoured fighting vehicles may be called upon to carry out firing practices either singly or in formation. When two or more armoured fighting vehicles are working together, they are said to be " in formation."

4. When firing singly :—

i. In the event of the vehicle stopping for any reason, guns will be unloaded and reported clear.

ii. Personnel will remain mounted until guns are reported clear.

iii. When dismounted, personnel will always fall in on the side of the armoured fighting vehicle furthest away from the target area.

5. When firing " in formation."—In addition to the precautions in para. 4, above, the following are specially applicable :—

i. When the scheme of firing necessitates a change of direction or formation which causes vehicles to cross the line of fire of other vehicles in the formation, the unit will be ordered to unload and " clear guns " before the change is carried out.

ii. In the event of a vehicle " in formation " losing station so as to endanger, or to be in danger from, other vehicles in the formation, the formation will be halted and all guns will be unloaded and cleared. The formation will remain halted until special orders to meet the circumstances are issued by the conducting officer.

6. Duties of personnel concerned in safety precautions :—

i. The superintending officer.—All practices with live shell or ball ammunition will be fired under the general supervision of the officer commanding the sub-unit being exercised (hereinafter called the superintending officer). He will be responsible for ensuring that :—

(*a*) Range discipline is maintained.

(*b*) Local orders for the safe conduct of firing on the range are explained and complied with.

(*c*) The order of firing of his men is arranged.

(*d*) No one comes up to the vehicles except the crew being exercised.

(*e*) A N.C.O. is detailed to superintend the issue of ammunition and the collection of empty cases.

(*f*) A tank commander is detailed to superintend the firing in each tank.

(*g*) All movements of personnel and vehicles are carried out in accordance with the appropriate drill.

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(*h*) The practice is carried out properly and the orders of the conducting officer are complied with.

(*i*) The necessary safety precautions arising from changes in formations, etc., embodied in the scheme are observed.

(*j*) A red flag is kept raised in the vicinity of the armoured fighting vehicles carrying out firing exercises when no firing is taking place and is lowered only on his orders. This order will not be given until he has satisfied himself that the ranges are open for firing.

(*k*) The order to begin firing is given.

(*l*) Tanks are inspected for live ammunition at the conclusion of firing, and the necessary certificate rendered in accordance with King's Regulations, 1935, para. 1013 (*b*).

ii. The conducting officer.—In circumstances where the nature of the practices to be fired is complicated, either because of the number of armoured fighting vehicles firing at one time, or owing to the contour of the ground, the lay-out of the targets or the restriction of the safety angles, it will be necessary for a conducting officer, additional to the superintending officer, to accompany the formation for the purpose of ensuring the observation of safety precautions and of dealing with emergencies arising outside the scheme. (*See also* para. 6, i. (*h*), above.)

The officer must be well acquainted with all the details of the range and the nature of the practice being fired.

When armoured fighting vehicles are firing "In formation," he will be responsible for taking all possible steps to ensure that firing is stopped if :—

(*a*) An armoured fighting vehicle loses station sufficiently to endanger, or to be in danger from, other vehicles in the formation.

(*b*) Any vehicle exceeds the danger angles for the range.

(*c*) It is dangerous to continue firing for any other reason.

In the event of a vehicle becoming a casualty on the range, he will be responsible that the action taken as regards its disposal is safe. He should issue instructions, before firing begins, to all concerned as to the method which he will adopt to order firing to cease. He will then ensure that the means which he is going to employ is available at hand for his use.

iii. The tank commander.—The tank commander will be responsible for ensuring that :—

(*a*) When armoured fighting vehicles are firing singly :—

i. Crew drill is properly carried out at all times by the personnel under his command.

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ii. No guns in his vehicle are loaded and no firing takes place until the order to begin firing has been given by the superintending officer.

iii. Before his vehicle is turned through such an angle as would bring the guns being fired to bear in a direction dangerous to other armoured fighting vehicles or to areas outside the danger area as laid down for the range on which the firing is taking place, all guns are unloaded and reported clear.

iv. In the event of his armoured fighting vehicle stopping for any reason, orders are given to his gunners to unload and clear guns.

(*b*) When armoured fighting vehicles are firing "in formation."—In addition to the above :—

i. All signals are acknowledged and complied with.

ii. Should his vehicle be in a position to endanger other vehicles of the formation, his guns are unloaded and reported clear without waiting for further orders.

iv. The gunner.—Owing to the limited supervision possible to the commander in an armoured fighting vehicle, a very definite responsibility for observing safety precautions must rest with individual gunners. They will be responsible for ensuring that :—

(*a*) They stop firing without waiting for orders if for any reason they consider their guns to be pointing in a dangerous direction.

(*b*) The gun drill of their respective weapons is carried out.

v. The range officer.—The range officer will be responsible for ensuring that :—

(*a*) A red flag is hoisted on some easily accessible position as a signal that the range is open for firing, and the necessary lookout men have been posted.

(*b*) A red flag is in possession of all personnel accommodated in butts on the range. This red flag will remain exposed during the entire period of cessation of fire and will only be withdrawn when the whole of the butt party is under cover. No one will leave a butt until the cessation of firing has been notified from the firing point, or in certain cases (*e.g.* battle practice) the central control position. A similar flag will be carried by all vehicles employed on range duties, *e.g.* towing, conveyance of targets, etc., when passing over the target area.

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7. General.—Drill or dummy cartridges will not be taken on any range where live ammunition is fired, except when stoppage practices are being fired. Dummy cartridges for this purpose will be taken on the range under unit arrangements and will be kept separate from live ammunition. They will be accounted for on the conclusion of the practices.

8. Accidents caused by explosions.—Should any accident, in the nature of an explosion, cause injuries to personnel, or should extensive damage to any weapon occur during firing from an armoured fighting vehicle, the officer superintending the practice will immediately report it to the officer commanding.

The remainder of the box of ammunition in use at the time will be preserved, and the description, maker and date of manufacture marked on the box will be noted. Everything possible will be done to facilitate investigation by the chief inspectors, by preserving the arms and ammunition concerned exactly as they were at the time of the accident. On return to barracks, King's Regulations, 1935, para. 759, will be complied with.

9. Signals.—The following fire order signals will be used during range practices :—

i. "**Action,**" signifying load and engage targets as ordered by the tank commander.
To be given by the two-letter code flag "T."

ii. "**Stop,**" signifying unload and clear guns as ordered by the tank commander.
To be given by the two-letter code flag "R."

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TABLE I

PELLET RANGE PRACTICES

The following practices will be fired in pellet ranges by :—

i. Recruits, Regular Army.
ii. Officers and trained men, tank units, Regular Army.

The principles affecting tank gunnery laid down in Tank Training, Vol. II, Part I, form the basis of all pellet range training.

Notes on Conduct of Practices

1. Preliminary lesson.—Before Table I is fired, a preliminary lesson, as follows, will be given to recruits, and to trained men at the discretion of the company, etc., commanders :—

i. A brief explanation of the object of pellet range training and of the characteristics required of a tank gunner. (Tank Training, Vol. II, Part I.)
ii. Safety precautions.
iii. The method of falling in, mounting and procedure on the order " Change round."
iv. Correct firing position.
v. Methods of :—

(*a*) Loading.
(*b*) Firing.
(*c*) Unloading and clearing gun.
(*d*) Adjustment of forehead pad.
(*e*) Inspection of sights and mountings.

vi. Explanation and practice in aiming with the telescope.
vii. Demonstration of the method of traversing, elevating and depressing the gun, followed by imitation.

2. Targets.

i. Paper targets.—Large target (6-ft.) 500/25 yds., with centre circle filled black.
ii. Landscape targets.—These should be approximately true to scale. One size only is required for each type of target on the sand table.

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(*a*) Metal tank (Fig. 1).
(*b*) As an alternative to (*a*), a silhouette paper target 1/120 tank size fixed to a metal sledge.
Note.—This type of target has the advantage of showing the actual position of shot holes but it has to be changed between details and the sledge is liable to be upset with consequent short delays.
(*c*) Anti-tank gun, ·8-inch square, in the open or behind cover.
(*d*) Infantry, machine guns, etc., should, if possible, be represented.

3. Scoring.—Paper targets : 5, 4, 3, 2.
Landscape targets : 5 points for each hit.
Rounds : 5 for each progressive stage of each practice, except where otherwise stated ; repetition may be carried out to any extent at the discretion of the instructor.

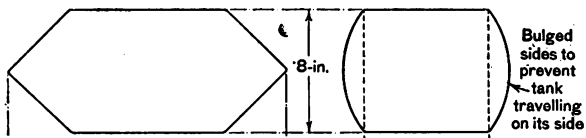

Fig. 1

4. Own tank movement—the platform will be oscillated in all practices when the gunner is sufficiently trained.
Where facilities exist for rotating the gun platform, broadside movement will be indicated by this means. Where no such facilities exist, the firer must be told to assume that he is moving *right* or *left* and the target moved in the opposite direction to give the illusion of " own movement."
Own speed will normally be given to the gunner by the instructor, or, in advanced stages of training, he may be required to judge his speed by the error in aim-off against an enemy target.
Head-on or *tail-on* movement will be indicated by oscillation without rotation.

5. Enemy movement.—The deflections of the air rifle which become necessary in practices involving aim-off for own and/or enemy movement, due to the fact that the pellet has no appreciable time-of-flight, will be applied by means of the air-rifle deflection apparatus for use in pellet ranges.

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6. Qualifying practices.—Practices marked with an asterisk will be re-fired as qualifying practices by all ranks referred to in the heading to Table I, above, at any time after they have been fired as instructional practices and before Tables III and IV are fired.

Records of results obtained will be kept by company, etc., commanders.

7. The following practices may be used for training tank gunners on any weapon or mounting with which a pellet range may be equipped.

In all 3-pr. practices the air rifle will be fired directly by the gunner. In machine gun practices it may be fired directly by the gunner or indirectly by the instructor. In the former case it is equivalent to using the machine gun as a single shot weapon and it is therefore appropriate to certain lessons only, *e.g.* accuracy, rapidity of laying, aiming off, etc. When the air rifle is fired by the instructor, the action is as follows. The pressure of the firing mechanism by the firer operates electrically a vibrator the noise of which represents machine-gun fire. At any moment while the vibrator is operating the instructor may by a separate control fire the air rifle. The pellet thus represents one bullet out of the burst of machine-gun fire, and may equally well be the best shot or the worst. As the difficulty in maintaining an accurate aim is due to the oscillation of the tank, the platform, when the vibrator is in use, will always be oscillating, except in the first stage of Practice 5. (**Manipulation**—rotary wheel.)

It is clear that under these conditions absolute accuracy cannot be expected and there is a certain element of luck attached to the result. But generally the use of the vibrator will train a gunner to maintain as accurate an aim as possible for long periods, to follow continuously a moving target and to stop when he is so far off his aim that his fire is no longer effective. On the average the result will give a good indication of the capabilities of the firer.

The actual length of burst of machine-gun fire cannot be laid down, but as the object of this training is to enable a firer to maintain accurate aim as long as possible, the firer should be made to fire long bursts so long as he can keep on the target.

8. The standard laid down for qualifying practices is that which may be expected under the easiest conditions of range and speed for each practice. It is therefore under these conditions that a gunner must qualify. This must not, however, be allowed to excuse practice under more difficult conditions.

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TABLE I

PELLET RANGE TRAINING

No. of Practice	(*a*) Nature (*b*) Object	Target	Criticisms	Standard	Method of conducting and instructor's notes
(1)	(2)	(3)	(4)	(5)	(6)
1	(*a*) **Grouping.** (*b*) i. To ensure consistency of aim. ii. To avoid disturbance of aim when actuating the firing mechanism.	Paper target.	1. Size and location of group. 2. Points dealt with in preliminary lesson. 3. Correct handling of firing mechanism.	1-inch group. (No time limit.)	
2*	(*a*) **Manipulation of controls.** (*b*) i. Relaying on the target. ii. To practise the firer in the manipulation of the traversing wheel and of the means of elevating the gun.	As for No. 1.	1. Correct movement of hand wheels. 2. Time on aim. 3. Position of shots.	Score 15. Time 5 seconds a shot.	Before each shot the instructor will cause the gun to be moved off the target for elevation and direction. When the control is by hand wheel, the gun should be off about two turns of the wheel, the amount being varied with each shot. On the command "Fire," the firer will lay on the target and fire.

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(*a*) **Observation.** (*b*) To teach observation of fire and correction for subsequent shots.	Anti-tank gun.	1. Method of declaring observation. 2. Correction.	Nil.	*See* T.T., Vol. II, Part I. Before the practice is begun, an explanation will be given as to the method of declaring the point of aim and observation. The sights should be set off for elevation and direction so as not to exceed an error of 200 yards. Minor errors will be corrected by changing the point of aim. The range drum will not be altered for errors of less than 200 yards. For the first shot the firer will take a correct aim and fire. He will observe the fall of the shot and declare the correction required by the reference point method (T.T., Vol. II, Part I), altering the point of aim accordingly. As soon as the target is hit, the instructor will alter the sights for a fresh problem. *Note.*—This practice does not imply that a firer will never alter his range drum for errors of less than 200 yards, but it teaches him to aim up or down within these limits without the necessity of altering the range drum.

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TABLE I—*continued*

No. of Practice	(*a*) Nature (*b*) Object	Target	Criticisms	Standard	Method of conducting and instructor's notes
(1)	(2)	(3)	(4)	(5)	(6)
4*	(*a*) **Head on.** Fired from an oscillating platform. (*b*) i. To teach the gunner to fire from a platform oscillating in such a way as to simulate the movement of a tank travelling head-on. ii. To practise the firer in maintaining his aim when using a M.G. under these conditions.	Paper target.	1. Control of elevation. 2. Ability to seize opportunities during minor oscillations. 3. Time on aim. 4. Firing interval.	Score 15. Time limit for whole practice, 1 minute 30 seconds. When using vibrator, 7.	Before the practice is begun the instructor will explain the effects of oscillation and the methods by which they are overcome (T.T., Vol. II, Part I). The platform will be oscillated to simulate the movement of a tank travelling "head on." The firer will be told the assumed conditions, *e.g.* "Your tank is travelling 'head-on' at a speed of 5 m.p.h. and firing at a stationary target." The firer will be questioned as to where to aim if the sights are coming down or up on the target. This practice should be repeated with the vibrator. The instructor will explain the use of the vibrator. No definite length of burst should be laid down, but in order to develop the ability to keep on the target for long periods long bursts should be fired, and the rate of fire should be 250 rounds (approx.) in 1 min. 30 sec.

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5*	(*a*) **Manipulation of gun controls.** Rotary wheel target. (*b*) To practise control of the gun so as to inculcate instinctive movement of the elevating and traversing controls in the right direction.	Paper target in a revolving holder. 1 rev. a min. 2 „ „ 3 „ „ fired progressively.	1. Handling of controls. 2. Time on aim. 3. Ability to seize opportunities during minor oscillations.	Score 15. When using vibrator, 7.	The target movement in this practice does not simulate tank conditions. It is only intended to give the firer practice in manipulation. The practice will be fired progressively at the three target speeds, and in later stages the platform will be oscillated and vibrator used. The use of the vibrator in this practice helps to ensure that the firer does actually follow the target throughout.
6	(*a*) **Alteration of range.** (*b*) To practise the firer in the use of the range scale for :— i. Errors in estimation of range. ii. Alteration of range since last shot. iii. Change of target.	1. Metal tank target moving towards or away from the firer at a speed ordered by the instructor. 2. Anti - tank guns distributed over the landscape.	1. Observation. 2. Bold alteration of range.	Nil.	The range represented by various parts of the sand table should be explained. The instructor in his fire order will give a range which should be used for the firer for his first shot. Thereafter the firer will correct as necessary by altering his scale. This practice should be repeated with the vibrator and with a slightly oscillating platform. This will bring out the difficulty of correcting from observation when, as in M.G. fire, observation of only a small part of a burst is possible.
7*	(*a*) **Aiming off for enemy broadside movement.** (*b*) To teach the firer to select and apply the correct point of aim, to allow for enemy movement, and by practice to make this instinctive.	Metal tank moving broadside.	1. Observation. 2. Aim off. 3. Time on aim.	10	The practice will be fired at 10 m.p.h. at 1,000 yards increasing to 15 to 20 m.p.h. Repeat at 1,500 yards. The firer will be told the enemy tank speeds in elementary stages.

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TABLE I—*continued*

No. of Practice	(*a*) Nature (*b*) Object	Target	Criticisms	Standard	Method of conducting and instructor's notes
(1)	(2)	(3)	(4)	(5)	(6)
8*	(*a*) **Aiming off for own broadside movement.** Fired from a rotating platform. (*b*) To teach the firer to apply the correct point of aim to allow for the fling of the projectile, due to the movement of own vehicle, and by practice to make this instinctive.	Stationary tank target or anti-tank gun. Paper target when using vibrator.	1. Observation. 2. Aim off. 3. Time on aim.	10 When using vibrator, 10.	Before this practice is begun, the firer will be told his own speed. The direction is indicated by the rotation of the turret. This practice will be fired at 10 m.p.h. at 1,000 yards increasing to 15 and 20 m.p.h. Repeat at 1,500 yards. The vibrator should be used in later stages of this practice.
9*	(*a*) **Aiming off for combined movement of own and enemy tanks.** (*b*) To teach the firer to apply the correct point of aim for varying situations and eventually to make this instinctive.	Metal tank.	1. Observation. 2. Aim off. 3. Time on aim.	10	The tank movement will combine the movement of Practice 7 and 8 at varying speeds.
10	(*a*) **Elementary battle practice.** (*b*) i. To combine the lessons of the previous practices. ii. To give practice in	Metal tank target, anti-tank guns, infantry, etc.	1. Observation. 2. Time on aim. 3. Correction for subsequent shots 4. Choice of weapons.	Nil.	The situation will be elementary and the speeds and alteration in range, etc., gradually increased. Two or three targets should be made to appear in succession at different ranges and the firer

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	changing over from 3-pr. to co-axial machine gun, or from ·5-inch to ·303-inch machine gun.				should engage these as they appear with the appropriate weapons. Fire effect should be indicated as far as possible to the firer by stopping moving targets or switching off ANT. where they have been successfully engaged.
11	(*a*) **Advanced battle practice.** (*b*) i. To practise the firer as nearly as possible in a pellet range, under war conditions. ii. To practise N.C.Os. as tank commanders.	Metal tank, anti - tank guns, etc.	—	Nil.	The situation will be similar to that in Practice 10, but in addition will include switching from one target to another by order of the instructor. When two turrets are able to fire over the same area, the principle of distribution of fire should be introduced. This practice also offers opportunities for training tank commanders in fire orders.

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TABLE II

30-YARDS RANGE PRACTICES FOR ·303-INCH VICKERS MACHINE GUN

To be fired by all units of Royal Tank Corps

Recruits and Trained Men

Ammunition : Recruits.

Stage I.	205 rounds (Practices 1–7 inclusive).
Stage II.	185 rounds (Practices 2–7 inclusive).
Total	390 rounds.

Trained men. 185 rounds (Practices 2–7 inclusive).

Notes 1.—These practices will be fired through twice by each recruit of the Royal Tank Corps, with the exception of Practice 1, which will only be fired once. The first time of firing will be instructional. When firing the second time, the recruit will qualify in Practices 2 to 7.

Trained men of the Royal Tank Corps will fire Practices 2 to 7 inclusive at least once during the Individual Training Season. These practices will be qualifying and the results recorded.

2.—When it is stated that the practice will be fired from a stationary platform, the "rypa" will be "free" and not scotched.

3.—In practices where the grid is used it will be placed on the target with the 9-inch side vertical and the centre of the grid on the M.P.I., except when firing with the Mark I gun in a ball mounting, when the 9-inch side will be horizontal.

4.—It is essential, before firing, that the M.P.I. for each gun and telescope be ascertained. The procedure for this will be as follows :—Fit the gun and telescope to the mounting, set the range at 600 yards and load for single shot action. Take a careful point of aim in the centre of the aiming mark and fire ten rounds as accurately as possible. The centre of the resultant group will be the M.P.I. Measure the distance of this point from the centre of the aiming mark. This point is

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now fixed and can be marked on the target in relation to all other aiming marks used for this particular gun and telescope. The centre of the grid will be placed on this point. Should either the gun or telescope have to be changed, a new M.P.I. must be found.

5.—Where the R.T.C. Instructional Target, 18-inch Tank design, is used, the aiming mark will be placed in such a position that the M.P.I. is approximately in the centre of the target.

6.—Training in handling of belt boxes will be carried out throughout the table. Before each practice, there will either be no belt box in the carrier or the box will be empty. This will necessitate the gunner, on the command " action," having either to obtain a box and place it in the carrier or to change the empty box with a full one before the gun can be loaded.

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TABLE II

TO BE FIRED FROM MK. IV OR VI GUN IN GIMBAL OR TRUNNION MOUNTING

No.	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Criticisms	Standard	Method of conducting
(1)	(2)	(3)	(4)	(5)	(6)
1	(*a*) **Introductory.** Fired from a stationary gun platform. (*b*) To afford the recruit an opportunity of firing in the early stages of training. (*c*) 20.	R.T.C. M.G. Instructional Target.	1. Position adopted by firer. 2. Holding. 3. Gun shyness. 4. Position of shots.	Nil.	To be fired in two bursts, appropriate fire orders to be given. *Note.*—Recruits should receive a lesson on holding, aiming, firing and clearing the gun before firing this practice. This practice will not be fired more than once by any man.
2	(*a*) *Grouping.* Single shots fired from a stationary platform. (*b*) i. To teach the firer to focus the target and not the sights. ii. To enable the instructor to analyse errors in aiming and holding. (*c*) 10.	As for practice 1.	1. As for Practice 1. 2. Consistency of aim. 3. Hesitation in pressing the trigger.	8 hits in 3-inch group.	The gun will be loaded for single shots. The instructor will disturb the aim by ordering "Traverse right, or left" after each shot has been fired, to ensure that a fresh aim is necessary for subsequent shots. *Note.*—The instructor must ensure that the firer keeps his eye to the telescope during reloading.
3	(*a*) *Application.* Fired from an oscillating platform. (*b*) To teach the firer to con-	Horizontal moving target R.T.C. M.G.	1. Control of gun and mounting. 2. Accuracy.	20 hits in 9 by 6-inch grid.	Gun to be fully loaded. The 40 rounds will be fired in short bursts of 3 or 4 rounds. During

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	trol the gun during short bursts and to relay accurately and quickly. (*c*) 40.	Instructional Target 18-in. Tank Design.	3. Delay between bursts.		the practice the oscillation of the platform will be varied to represent an A.F.V. crossing good or bad ground, and the firer should be told not to fire when the oscillation is such that he cannot fire a short accurate burst. *Note.*—This practice, besides training a firer to relay quickly and accurately, teaches him to use a machine gun, *e.g.* ·5-in., as an anti-tank weapon. The target will be moved across the front at a speed equivalent to 8 to 12 m.p.h. at 500 yards, *i.e.* approximately 8 to 12 inches a second. The speed and direction of movement should be irregular, but the movement should be smooth.
4	(*a*) **Application.** Fired from an oscillating platform. (*b*) To teach the firer to control his gun during longer bursts and maintain his aim by traversing while firing. (*c*) 20.	As for Practice 3.	1. Control of gun. 2. Maintenance of aim. 3. That gun is kept swinging when firing. 4. Rapidity in seizing the opportunity to fire when platform is steady.	5 hits in 9 by 6-in. grid.	When the gun is fully loaded, the platform will be oscillated freely until the target is in motion. The instructor will then simulate the conditions of an A.F.V. crossing favourable ground by reducing the oscillation. The firer should seize the opportunity to fire the 20 rounds in one burst. Target speed as for Practice 3.

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TABLE II—*continued*

No.	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Criticisms	Standard	Method of conducting
(1)	(2)	(3)	(4)	(5)	(6)
5	(*a*) **Application.** Fired from an oscillating platform. (*b*) To teach the firer :— i. To control the gun and mounting. ii. To control the bursts of fire. iii. To counteract the oscillation of the tank during long bursts. (*c*) 60.	As for Practice 3.	1. Control of gun. 2. Control of bursts. 3. Accuracy. 4. Use of periods of minor oscillations to fire long bursts.	20 hits in 9 by 6-in. grid.	The platform will be oscillated throughout the practice, but the type of oscillation will be varied. The firer should continue to fire unless the oscillation is such that he cannot maintain his aim with reasonable accuracy, and will resume firing again as soon as possible if he has had to stop. To be fired in not more than 4 bursts.
6	(*a*) **Immediate action.** (*b*) To practise the firer in the correct application of I.A. (*c*) 25.	As for Practice 1.	1. Handling. 2. Correctness of I.A. 3. Quickness and accuracy of relaying. 4. Size and position of group.	15 hits in 9 by 6-in. grid. Time 3 minutes.	**Practices 6 and 7.** The belts will be prepared as follows :—The rounds will be distributed in groups of 5 with a stoppage between each group. The gun will be loaded and one aiming mark indicated. On the command "Fire," the gunner will engage the aiming mark until the gun stops. After each successive I.A has been applied, he will relay and fire at the same aiming mark
7	(*a*) **Immediate action.** Moving target. (*b*) To test the firer in cor-	As for Practice 3.	As for Practice 6.	12 hits in 9 by 6-in. grid.	

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rect I.A. and quick relaying. (*c*) 30.			Time allowed 5 minutes.	until the total rounds are expended. The platform will be free whilst firing is taking place. No oscillation will be imparted to the platform other than that caused by the firer, but oscillation will be continued whilst the I.A. is being applied. Practice 7 may be fired as a competitive practice if desired. Practice 7. The target will be kept moving across the front for the length of the bay in either direction throughout the practice. Speed 9 inches a second.

Practices 6 and 7. The following stoppages will be set up. The order in which they appear may be varied, but it is advisable not to put the "No. 3s" together.

Practice 6. No. 4—Space in belt or missfire.
No. 2—Damaged or bulged round.
No. 3—Thick rimmed cartridge.
No. 4—Broken firing pin.

Practice 7. The same as for Practice 6, with the following addition :—
No. 3—Damaged extractor grooves.

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TABLE III

OPEN RANGE MACHINE GUN PRACTICES

Part A. To be fired by units equipped with medium tanks.
Part B. To be fired by units equipped with light tanks or armoured cars.
Part C. To be fired by light tank or armoured car units equipped with ·5-inch M.Gs.

Note.—Recruits will fire at the discretion of the Senior Instructor, Tank Gunnery School, such practices from these Tables as the ammunition allotted will permit.

A. TO BE FIRED BY OFFICERS AND TRAINED SOLDIERS OF UNITS EQUIPPED WITH MEDIUM TANKS

Practice	(*a*) Nature. (*b*) Object. (*c*) No. of rounds	Target	Range	Method of conducting
(1)	(2)	(3)	(4)	(5)
1	(*a*) **Application.** (*b*) To give firer practice in shooting from moving A.F.V. under easiest conditions. (*c*) 50 rounds.	Screen 16 by 8 ft.	600 yards	Target stationary. Own A.F.V. moving broadside to target at 5 m.p.h. Standard—5 hits.
2	(*a*) **Application.** (*b*) To give firer practice in shooting at greater tank speed and with co-axial gun also in action. (*c*) 50 rounds.	Screen 16 by 8 ft.	400 yards	Target stationary. Own A.F.V. moving broadside to target at 10 m.p.h. To be fired in conjunction with Practice 3. Standard—5 hits.

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3	(*a*) **Application.** Stoppages. (*b*) 1. To give firer practice in shooting from a moving vehicle. 2. To give loader practice in his duties in a moving vehicle. (*c*) 100.	Screen 8 by 8 ft.	600 yards to 400 yards	Target stationary. Own vehicle moving at 10 m.p.h. 5 stoppages will be set up at intervals in the 100 rounds. The course will be in the nature of a "Box" run, the firer engaging the target throughout the run. Standard—10 hits.
4	(*a*) **Application.** (*b*) To give firer practice in engaging moving target. (*c*) 100.	Screen 12 by 6 ft. on sledge.	600 yards	Target broadside in opposite direction at 5 m.p.h. Own speed broadside at 10 m.p.h. Standard—10 hits.
5	(*a*) **Application.** (*b*) To give firer practice in engaging a fleeting target at long range. (*c*) 100.	Screen 16 by 8 ft.	900 yards	Target stationary. Own vehicle stationary. The gun will be laid off the target and sights set at normal. 30 secs. will be allowed, which must include adjustment of sight and laying. *Note.*—The targets will be clearly numbered and each gunner assigned to a particular target at the last moment in order to bring out the fleeting nature of the target without recourse to special apparatus. Standard—20 hits.

Note.—Practices 1 and 2 will be fired from the Hull gun and Practices 3, 4 and 5 from the co-axial M.G. Hits to be counted in each practice.

Qualifying Standard—To qualify in the whole table a gunner must qualify in four out of the five practices.

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TABLE III—*continued*

B. To be fired by officers and trained soldiers of units equipped with light tanks and armoured cars

Practice	(*a*) Nature. (*b*) Object. (*c*) No. of rounds.	Target	Range	Method of conducting
(1)	(2)	(3)	(4)	(5)
1	(*a*) **Stoppage.** (*b*) To give practice in handling. (*c*) 40.	Screen 8 by 8 ft.	600 yards	Own speed 5 m.p.h. broadside. 7 stoppages will be set up at intervals in the 40 rounds. Standard—5 hits.
2	(*a*) **Application.** (*b*) To give practice in shooting from a moving A.F.V. under easiest conditions. (*c*) 160.	Screen 8 by 8 ft.	600 yards to 400 yards	The run will be a " Box " run starting broadside at 600 yards and finishing with a tail-on run from 400 to 600 yards. The belt will be spaced and 40 rounds fired on each leg of the run. Broadside at 600 yards and head-on 600 to 400 yards, the speed will be 5 m.p.h. Broadside at 400 yards and tail-on at 400 to 600 yards, the speed will be 10 m.p.h. Standard—12 hits.
3	(*a*) **Application.** (*b*) To give practice in firing at greater tank speed. (*c*) 150.	Screen 16 by 8 ft.	600 yards to 400 yards	As for Practice 2, except that the speeds will be broadside at 600 yards, 10 m.p.h. Head-on and broadside at 400 yards and tail-on 15 m.p.h. Standard—12 hits.
4	(*a*) **Application.** (*b*) To give practice in engaging a fleeting target at long range. (*c*) 100.	Screen 16 by 8 ft.	900 yards	Target stationary. Own vehicle stationary. The gun will be laid off the target and the sights set at normal. 30 secs. will be allowed, which must include adjustment of sight and laying. *Note.*—The targets will be clearly numbered and each gunner assigned to a particular target at the last moment in order to bring out the fleeting nature of the target without recourse to special apparatus. Standard—12 hits.

Qualifying Standard.—To qualify in the whole table a gunner must qualify in three out of the four practices.

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C. To be fired by officers and trained soldiers of all light tank and armoured car units equipped with the ·5-inch machine gun

No. of Practice	(*a*) Nature. (*b*) Object. (*c*) No of rounds.	Target	Range	Method of conducting
(1)	(2)	(3)	(4)	(5)
1	(*a*) **Long range, stationary.** (*b*) To give firer practice in engaging a fleeting target. (*c*) 25.	Tank shaped light tank size.	700 yards	To be run in conjunction with Practice 4, Light Tank ·303-in. practices. After engaging the target with ·303-in. machine gun, the firer will change to ·5-in. machine gun and will engage another target. This target will be exposed 6 times for 7 seconds at each exposure. Not more than 5 rounds should be fired in any one burst.
2	(*a*) **Broadside application.** (*b*) To give practice in engaging a moving target. (*c*) 35.	Tank shaped light tank size moving in opposite direction to own movement at 10 m.p.h.	600 yards	Own speed 10 m.p.h. Bursts of not more than 5 rounds should be fired.

Qualifying Standard.—Total of 6 hits.

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TABLE IV

SUB-CALIBRE PRACTICES

Practices to be fired by recruits, officers and trained men of tank units of both medium and light tank sections (Regular Army) (with the co-axial ·303-inch Vickers machine gun, in the case of medium tanks), firing single shots and using observing ammunition.

Ammunition allowed :—Recruits and trained men 40 rounds S.A. observing.

No. of Practice	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Range	Criticisms	Method of conducting
(1)	(2)	(3)	(4)	(5)	(6)
1	(*a*) **Application broadside.** (*b*) To provide, in the case of medium tanks, a link between Tables I and V under actual tank conditions, but at a range such that the firer can get good observation of ·303-in. single shots, and in the case of light tanks as a preliminary to firing ·5-in. machine gun practices. (*c*) 5.	Tank shaped steel plate 1/5 actual tank size.	150 yards	(1) Observation. (2) Time on aim. (3) Accuracy.	A steel plate will be erected in a stop butt which will give observation to the firer. The co-axial gun will be loaded for single shots. The tank will run broadside at a speed of not more than 5 m.p.h. on good ground. The length of the run will depend on the safety angle of the particular range, but should be between 30 yards and 50 yards. The sights must be carefully adjusted before the practice begins, and each firer should be allowed to fire one round from a stationary tank to prove the sights. Accuracy is more important than rapidity of firing. The flash of observing ammunition striking a steel plate is quite distinct from the observation obtained on the stop butt.
2	(*a*) **Application head-on.** (*b*) As for Practice 1. (*c*) 5.	As for Practice 1.	175 yards to 125 yards	As for Practice 1.	As for Practice 1, except that the tank will advance from 175 to 125 yards. The sights should be adjusted at 150 yards. This will cause the gun to shoot slightly left at 175 yards and slightly right at 125 yards.

Note.—These two practices should be repeated as required, and when the firer is proficient, deflection may be put on the sights to give the firer practice in "*Aim-off.*" But this should not be until a standard of 3 hits out of 5 shots is obtained.

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TABLE V

3-PR. PRACTICES

To be fired by selected trained men of tank units (Regular Army). Recruits will fire a modified course.

Practice	(*a*) Nature. (*b*) Object. (*c*) No. of rounds.	Target and Range	Method
(1)	(2)	(3)	(4)
1	(*a*) **An introductory broadside practice** under easiest conditions. (*b*) To exercise gunner in aim off for own movement. (*c*) 6.	8-ft. screen (stationary) 500 yards	Tank speed 5 m.p.h. Hits to be counted.
2	(*a*) **A more difficult broadside** than Practice 1. (*b*) To exercise the gunner in aim off for both movements. (*c*) 6.	Tank size moving target (sledge) 5 m.p.h. 500 yards.	Tank speed 5 m.p.h. Target to move in opposite direction to tank. Hits to be counted.
3	(*a*) **A broadside practice at fleeting target.** (*b*) To teach the firer to seize brief opportunities of engaging target. (*c*) 6.	Tank size target. 650 yards.	Own tank speed 5 m.p.h. Target exposed 6 times. Each exposure for 7 secs. Target will not always appear in same place. Hits to be counted.
4	(*a*) **Diagonal practice including the co-axial gun.** (*b*) To exercise the gunner in combination of head-on and broadside movement, and in the use of the change-over lever and the range drum. (*c*) 6. 50—·303-in.	Tank size target for 3-pr. A.T. Gun target for co-axial, both stationary. 1,000 yards to 600 yards.	Tank speed 5 m.p.h. Co-axial target to be to a flank of 3-pr. Co-axial fire order to be given after 3 rounds of 3-pr., then 3 rounds of 3-pr., then remaining co-axial, 3-pr. must be distributed over full length of run. Hits to be counted.
5	(*a*) **Long range practice, broadside.** (*b*) To give practice in observation at long range. (*c*) 6.	Tank size target. Stationary. 1,500 yards.	Tank speed 3 m.p.h. Hits to be counted.

Standard—10 hits to pass.

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TABLE VI

SMOKE PRACTICES

To be fired by selected trained soldiers

Ammunition allotted—420 rounds.

Practice	(*a*) Nature. (*b*) Object. (*c*) No. of rounds.	(*a*) Target. (*b*) Range.	Method of conducting
(1)	(2)	(3)	(4)
1 For demonstrating to the whole unit.	(*a*) **Demonstration.** (*b*) Elementary principles of smoke. (*c*) 10.	(*a*) Two or three areas (*b*) Varying from 500 yards to 1,000 yards.	To be conducted and fired by selected trained personnel. Stationary tank alongside spectators. Later tank to move to show effect of alteration of angle.
2 For training new personnel. 20 crew commanders, 20 gunners.	(*a*) **Combined practice for tank commander and gunner.** (*b*) Training of tank commander and gunner together in the construction of a smoke screen. Subsequent continuation by gunner alone. (*c*) 5 rounds tank commander control. 5 rounds gunner control.	(*a*) Surprise areas to be pointed out at beginning of practice and changed for each crew. (*b*) Varying from 600 yards to 1,000 yards.	Tank moving broadside at 10 m.p.h. targets may be anywhere within arc of 100 degrees. First 5 rounds to be controlled by tank commander, remaining 5 rounds to be continued by gunner alone.
3 For training new personnel. 20 crew commanders, 20 gunners.	(*a*) **Combined advanced practice for tank commander and gunner.** (*b*) To train the tank commander and gunner in construction of a smoke screen when separated from unit it is protecting. (*c*) 6 rounds tank commander control.	(*a*) Surprise areas to be indicated and varied by conducting officer. (*b*) Varying from 800 yards to 1,500 yards.	Tank moving broadside or head-on. Conducting officer with close support tank, marking officers in centre of moving unit. Spectators in central position between the two.

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4	(*a*) **Tactical combined practice.** (*b*) To train section and company commanders in the tactical handling of their close support tanks and to train commanders of close support tanks in the necessary tactical co-operation with their units. The tank commanders and gunners who have been trained the previous year will co-operate in this practice. (*c*) 30 per Company. Each company will exercise the company commander and one other officer at 15 rounds each. At the same time 4 tank commanders and 4 gunners will be exercised. These personnel will be those who have received mortar training in the previous year.		One run a company at 30 rounds each. The exercise should be carried out by the whole company with light sections and medium sections deployed at normal distances. Two close support tanks a company at 15 rounds each should be employed, control being exercised through the company commander by wireless.

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TABLE VII

TERRITORIAL ARMY RECRUITS AND TRAINED SOLDIERS

To be fired by units equipped with Rolls-Royce armoured cars on a 30-yards range.

Ammunition allowed—Recruits : 137 rounds. Trained soldiers : 79 rounds.

Note 1—Recruits will fire all practices and will fire Practice 7 twice.

Note 2—Trained soldiers will fire Practices 3, 5, 6 and 7. These practices will be fired annually. They are marked with an asterisk (*) for convenience of reference.

Note 3—Practices 3, 5, 6 and 7 should be fired from a rypa. The rypa should be free, except in cases where it is stated that it should be oscillated.

A rypa is a device whereby a machine-gun mounting may be moved in a manner to simulate the movement of an armoured car.

Where facilities do not exist for the rypa or for moving targets, company commanders will use their own discretion for the expenditure of the ammunition allowed for these practices.

No. of Practice	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Criticism	Standard and remarks	Method of conducting
(1)	(2)	(3)	(4)	(5)	(6)
1	(*a*) **Introductory.** Fired from a stationary mounting. (*b*) To afford the recruit an opportunity of firing the weapon during the early stages of training. (*c*) 10.	R.T.C. M.G. Instructional Target.	1. Position adopted by firer. 2. Method of holding. 3. Gun shyness. 4. Position of shots.	The practice is intended for men who have never fired the gun before. Ammunition, if not required for this purpose to be at the disposal of commanding officer for repetition purposes.	To be fired in one group at any convenient aiming mark.

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2	(*a*) **Manipulation of mounting.** Fired from a stationary position. (*b*) To enable the instructor to analyse faults and inaccuracies due to aiming, handling, and hesitation in pressing the thumb-piece. (*c*) 9.	As in Practice No. 1.	1. As in Practice No. 1. 2. Reasonable rapidity in manipulation of the mounting.	Shots to be within the 3-in. circle of the grid. For grid measurement (*see* Plate II). Standard—7 Hits.	Gun to be loaded for single shots. On the command "Fire," the gunner will engage each of the nine bulls in succession. Time limit :— Recruits :—60 seconds. Trained soldiers : 45 seconds.
3*	(*a*) **Application.** Fired from a stationary mounting. (*b*) To teach control of gun and mounting when applying fire to a given point. (*c*) 20.	As in Practice No. 1.	1. As in Practice No. 1. 2. Degree of proficiency as shown by the close grouping. 3. Proficiency in maintaining aim during rapid fire.	It takes at least 5 rounds before the gunner can appreciate, and begin to counteract, the initial throw of the gun. Standard :— Recruits :—10 shots in a 9 by 6-in. grid. Trained soldiers :—12 shots in a 9 by 6-in. grid.	Gun to be loaded and aimed at an isolated bull's eye. The gunner to fire the rounds in one burst, endeavouring to regain and maintain aim disturbed by the initial vibration of the gun.
4	(*a*) **Vertical application.** Fired from an oscillating rypa at a vertically moving target. (*b*) To practise the firer in aiming and firing quickly at a vertically moving target from an oscillating rypa and to practise manipulation of the mounting. (*c*) 9.	R.T.C. M.G. Instructional Target, 18-in. Tank Design, in vertical gallows.	1. Time on aim. 2. Manipulation of mounting.	The rypa will be rocked to simulate the movement of an armoured car firing broadside. Standard :— Trained soldiers—7, Recruits—5, in a 9-in. by 6-in. grid.	The gun will be loaded for single shots. The firer will engage the vertically moving target, which will be manipulated so as to rise and fall irregularly at the rate of 4-in. to 6-in. a second. The rypa will be rocked slightly.

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TABLE VII—*continued*

No. of Practice	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Criticisms	Standard and remarks	Method of conducting
(1)	(2)	(3)	(4)	(5)	(6)
5*	(*a*) **Horizontal application.** Fired from an oscillating rypa at a horizontally moving target. (*b*) To practise the firer in quickly aiming and firing at a horizontally moving target from an oscillating rypa and to give further practice in manipulation of the mounting. (*c*) 9.	As in Practice No. 4. Target arranged to move horizontally.	1. Time on aim. 2. That shots must be fired while following the target and not as the target is passing the sights.	Target movement of 9-in. a second gives the same angular movement to the mounting as when firing broadside from an armoured car going at 10 m.p.h. at 500 yards from the target (approx.) Standard :— Trained soldiers—7, Recruits—5, in a 9 by 6-in. grid.	The gun will be loaded for single shots and the target set in motion in one direction at a speed of 9-in. a second.
6*	**Horizontal Application. rapid.** Fired from an oscillating rypa. (*b*) To teach the firer to apply his fire to a horizontally moving target from an oscillating rypa. To control his gun and mounting.	As in Practice No. 5.	1. Control of gun. 2. Control of mounting. 3. Control of bursts. 4. That the point of aim is maintained on the moving target. 5. Rapidity in	The rypa is oscillated intermittently ; this permits steady moments, during which the gunner should seize the opportunity to fire. Standard :— 5 hits in a 9 by 6-in. grid.	Gun to be fully loaded. Target to be moved at a rate of 9-in. a second in one direction. Platform to be rocked intermittently. Rounds to be fired in not more than two bursts.

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	To control his bursts of fire. To maintain his point of aim. (*c*) 20		seizing the opportunity to fire when the platform is steady.		
7*	(*a*) **Immediate action, Grouping Practice.** Fired from an oscillating rypa. (*b*) To test the firer in correct I.A. Quick and accurate relaying. (*c*) 30.	As in Practice No. 1.	1. Handling when applying I.A. 2. Correct application of I.A. 3. That haste in applying I.A. does not result in slovenly action.	The firer should have to cure five different but normal stoppages. The practice may be conducted as a competition; accuracy and time being the deciding factors. Scoring :— 15 shots in a 9 by 6-in. grid.	A belt containing 30 rounds, excluding stoppages, prepared in such a manner that the 5th, 10th, 15th, 20th and 25th rounds will cause the gun to stop, to be used. The gun will be loaded and one isolated bull's eye indicated. On the command "Fire," the gunner will engage the aiming mark indicated until gun stops. After I.A. has been applied, he will relay and fire at the same aiming mark until the total rounds are expended. The rypa will be free during the firing, but will be oscillated during the application of I.A.

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TABLE VIII

RANGE PRACTICE FOR ·303-IN. VICKERS MACHINE GUN

To be fired by Territorial Army units equipped with Rolls-Royce armoured cars.
(Only those who have reached the standard laid down for 30-yards range practices may be exercised.)

Recruits.

Ammunition allowed—70 rounds

No. of practice	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Range, yards	Method of conducting	Criticism	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	(*a*) **Observation.** Moving car. Broadside. (*b*) To teach the firer to apply his fire to a stationary target. (*c*) 30.	8 ft. by 8 ft. screen.	300	The car will move broadside to the target. Fire will not be opened until a speed of at least 10 m.p.h. is attained. The 30 rounds should be fired in not more than two bursts.	1. Holding. 2. Accuracy. 3. Aim off. 4. Control of bursts.	Shot holes should be counted.
2	(*a*) **Application.** (*b*) To teach the firer to engage a target under slightly more difficult conditions. (*c*) 40.	As in Practice No. 1.	500	To be fired in suitable bursts according to the facilities for observation. Fire will not be opened until a speed of at least 15 m.p.h. is attained.	1. Steady holding. 2. Accuracy. 3. Correction from observation. 4. Control of bursts.	Bursts should consist of at least 10 rounds. Shot holes should be counted.

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TABLE IX

RANGE PRACTICES FOR ·303-IN. VICKERS MACHINE GUN

To be fired by Territorial Army units equipped with Rolls-Royce armoured cars.

(Only those who have reached the standard laid down for 30-yards range practices may be exercised.)

Trained Soldiers

Ammunition allowed—105 rounds

No. of practice	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Range, yards	Method of conducting
(1)	(2)	(3)	(4)	(5)
1	(*a*) **Application.** Moving car. Broadside. (*c*) 35.	8 ft. by 8 ft. screen.	300	The car will move broadside to the target; all loop holes and doors will be closed. No assistance may be given to the firer. Fire will not be opened until a speed of 10 m.p.h. is attained.
2	(*a*) **Application.** Moving car. Head-on. (*c*) 35	As in Practice 1.	600 to 300	The car will move head-on towards the target. All loop holes and doors will be closed. No assistance may be given to the firer. Fire will not be opened until a speed of 15 m.p.h. is attained.

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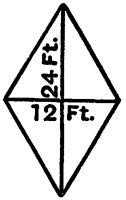
TABLE IX—*continued*

No. of Practice	(*a*) Nature (*b*) Object (*c*) No. of rounds	Target and appliance	Range, yards	Method of conducting
(1)	(2)	(3)	(4)	(5)
3	(*a*) **Application.** Moving car. Head-on. (*b*) To encourage the crew to work as a team. (*c*) 35.	1—8 ft. by 8 ft. screen, or 12 falling plates arranged covering an area as in diagram below :  	600 to 300	The crew will be formed up 20 yards behind the 600 yards firing point ; the gun will be prepared and laid on a ground sheet. On a given signal, the crew will :— (*a*) Mount the gun. (*b*) Start up and mount. (*c*) Advance to the 300 yards firing point engaging the target. Marking :—Each shot on the screen or plate knocked down to count 5 marks. Time allowed—three minutes. For every ten seconds or portion thereof above this time 3 marks will be deducted. Possible marks—175.

Note.—Practice 3 may be modified to suit local conditions.

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APPENDIX I

SPECIMEN FORM FOR RECORDING TESTS OF ELEMENTARY TRAINING AND RANGE PRACTICES

Company..... Unit..... Section.....

RECORD OF TESTS OF ELEMENTARY TRAINING AND RANGE PRACTICES

Note.—This record should normally be kept by inserting the letter "P" or "F" in the appropriate column against each man's name. When, however, it is desired to record results obtained in greater detail, for comparative or competitive purposes, marks, or percentages, may also be entered.

Regt. No.	Rank	Name	T.O.E.T.																									Range practices								Remarks
			3-pr. or 3·7 in. How.								.303-in. or ·5-in. machine gun																										
			Oral.	Stripping.	Testing and adjusting sights.	Testing and adjusting firing mechanism.	Loading.	Sight setting.	Drill.	Oral.	Removing and replacing gun.	Stripping and assembling gun.	Stripping and assembling lock.	Renewal of packings.	Weighing and adjusting recoiling portions.	Weighing and adjusting Fuzee spring.	Loading.	Unloading.	Spare parts	I.A.	Belt filling.	Drill.	Pistol.	Judging distance.	Table I.	Table II.	Table III.	Table IV.	Table V.	Smoke practice.	Pistol.							

APPENDIX II

TYPICAL QUESTIONS FOR T.O.E.T. (ORAL TESTS)

Q.F. 3-PR. GUN, MARKS I AND II

1. On firing, the gun recoils and is returned to the run-out position. Explain the path of the oil during this action.
2. If the breech does not open with sufficient force to eject the empty case, what is the probable cause and remedy?
3. Explain why the gun will not fire until the breech is closed.
4. The first part of the unloading action is to withdraw the firing pin. How is this caused to happen, and why is it necessary ?
5. How are the gas affected parts cleaned after firing ?
6. Before going into action, oil is discovered to be leaking from the needle valve assembly. What method is employed to replenish the buffer ?
7. Preparation of a gun for firing is carried out in the following sequence : i. Gun. ii. Mounting. iii. Sights. iv. Spare parts—tools and ammunition. What are the chief points to which you would attend at each stage ?
8. Explain the action of the disengaging plate. (Mark II gun only.)
9. How is the breech block held in (i) the open position and (ii) the closed position ?
10. Explain why the breech mechanism lever and extractors are not splined to the actuating shaft.

·303-INCH VICKERS MACHINE GUN

1. (i) Fit a piece of gauze to the double pull-through.
   (ii) Explain when and how it is used.
2. Explain the action of the feed.

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3. (i) What are the three types of fouling ? (ii) How are these removed ?

4. Whilst in action, the muzzle attachment falls off. What probable stoppage would occur ?

5. How are the gas affected parts cleaned after firing ?

6. Explain why the sear is a safety device.

7. Whilst in action a series of misfires or separated cases occurs. What action would you take to get the gun firing again correctly ?

8. The recoiling portions are weighed and found to be much above the normal. What would probably cause this ?

9. If the roller breaks during firing, what stoppage occurs, and why ?

10. A question or questions involving a knowledge of spare parts and the method of packing them.

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APPENDIX III

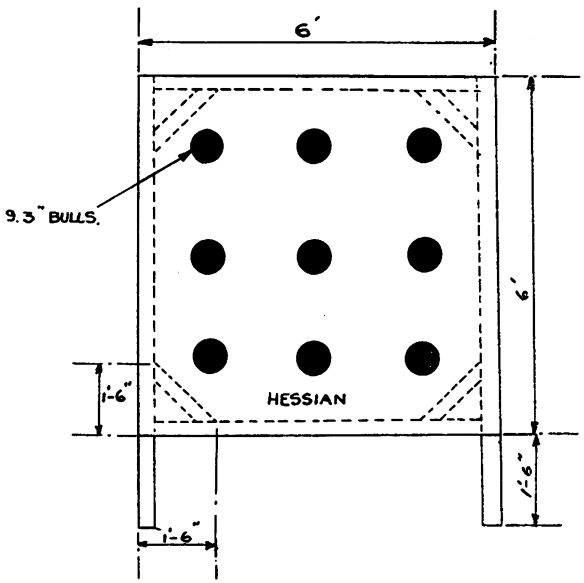
TYPES OF TANK TARGETS AND DETAILS OF CONSTRUCTION

All targets on which ·303-inch shot holes are to be counted should be paper covered.

1. *R.T.C. M.G.—Instructional targets* (30-*yds. range*).

i. 6 *ft. by* 6 *ft. target.*

Front view.



Materials :—Frame ... ... 3 in. by 2 in.
Corner pieces ... 1 ft. 6 in. by 2 in.
Canvas ... ... 6 ft. wide.

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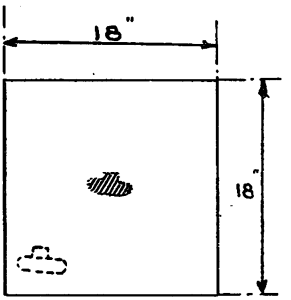
R.T.C. M.G., Instructional target—18 *in. design.*

ii. 18-*in. Tank design.*

Front view.



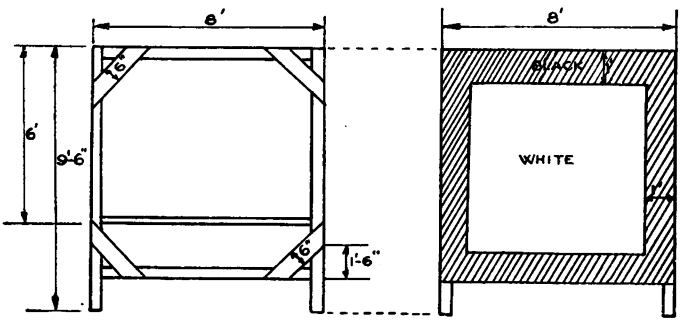
Material:—3-Ply.

Note.—Aiming mark to be placed so that the shots strike approximately in the centre of the target, allowance being made where there is no means of converging the sight and bore at 30 yards.

2. *Rectangle screen targets.*

i. 8 *ft. by* 8 *ft. target.*

Rear view. *Front view.*



Materials:—Frame ... ... 3 in. by 2 in.
Corner Pieces ... 6 in. by 1 in.
Cross Piece ... ... 2 in. by 2 in.
Canvas ... ... 6 ft. wide.

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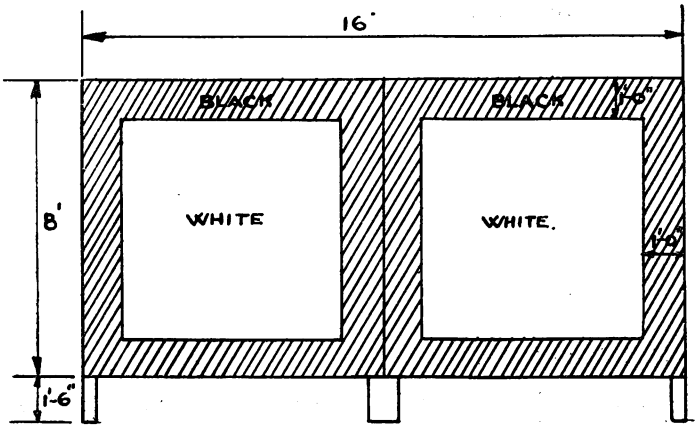
ii. 16 *ft. by* 8 *ft. Target,* arrangement for.

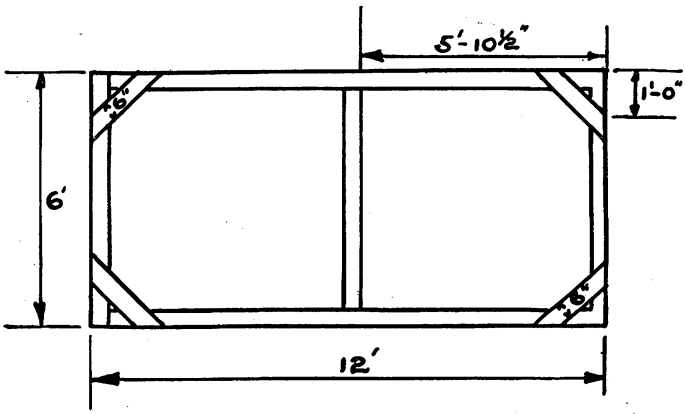
Front view.



Materials.—Same as for the 8 ft. by 8 ft. target.

iii. 12 *ft. by* 6 *ft. target.*

Rear view.



Materials :—Frame ... ... 3 in. by 2 in.
Corner pieces ... 6 in. by 1 in.
Canvas ... ... 6 ft. wide.

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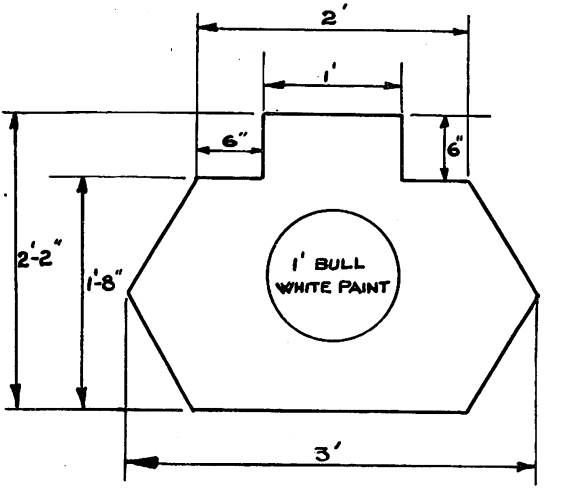
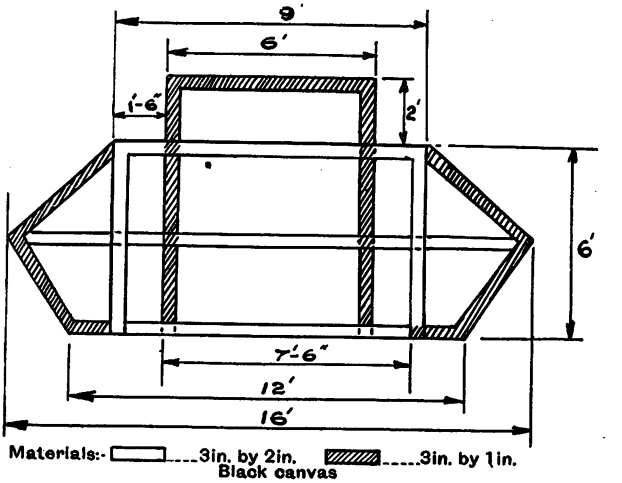
3. *Metal target, tank shaped* steel plate ($\frac{1}{6}$ actual tank size) for use with Table IV.



Material.—Steel plate $\frac{1}{2}$-in. thick.

4. *Tank targets for use on battle practice ranges*
   i. *For moving trolley or sledge (framework).*



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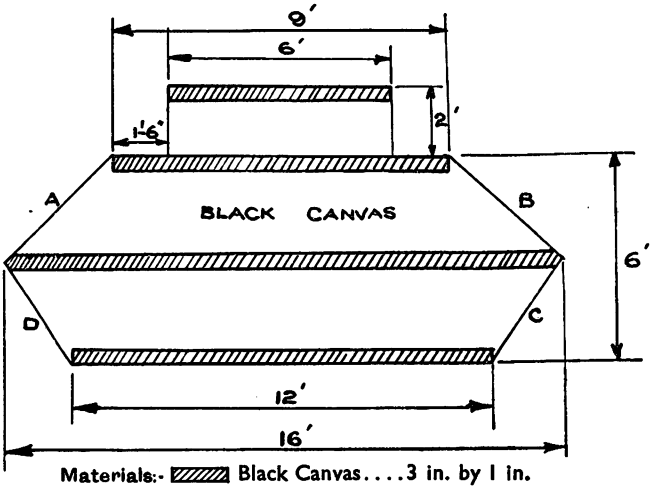
ii. *Collapsible.*



Note.—The edges A, B, C and D, are strengthened by wire threaded through the black canvas.

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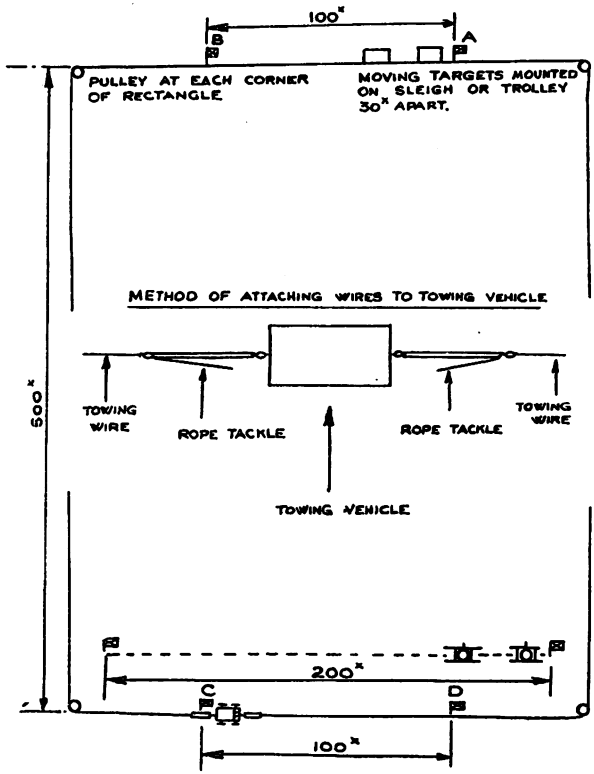
5. *Operating moving targets.*

i. *Moving trolley or sledge—*



Notes.—1. The towing vehicle will move from C to D, causing the targets to move from A to B. The towing vehicle will then return to C, causing the targets to move back to A.

2. A block and tackle put on the wires, at both front and back of the lorry, will allow the slack to be taken up on the wire. This will also make the repairing of broken wires easier.

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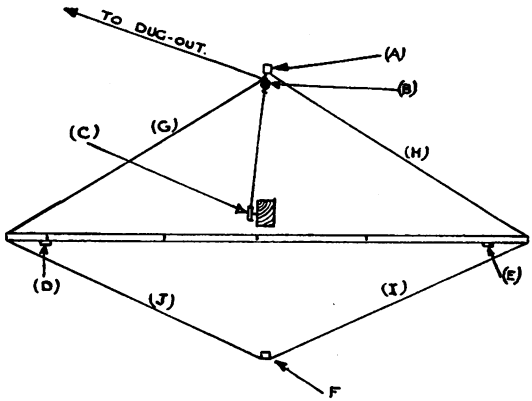
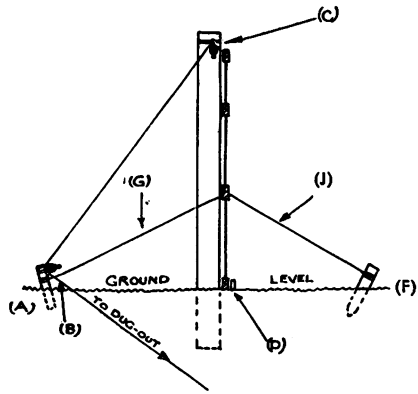
ii. *Operating collapsible targets*

Plan.



(A) Short peg driven into the ground.
(B) Snatch block wired on to peg (A).
(C) Snatch block wired on to main post.
(D) Short peg for securing base of target.
(E) Short peg for securing base of target.
(F) Short peg for wire stays.
(G, H, I, J). Wire stays wired on to target.



Elevation.

The main post is 11 ft. long of 4 in. by 3 in. timber, sunk 2 ft. into the ground leaving 9 ft. above.

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APPENDIX IV

SUGGESTED METHOD OF CONDUCTING IMMEDIATE ACTION COMPETITIONS FOR THE ·303-INCH VICKERS MACHINE GUN, MKS. I AND IV

1. *General.*—Three guns correctly mounted three paces apart.

Target for each gun with similar aiming mark. The target will be indicated in the form of a fire order on the first gun, followed by "*Same target—go on*" for the remaining two.

Marking.—For each stoppage cured correctly—20 marks.

If all three stoppages are cured correctly, a bonus of 10 marks may be given.

Time allowed for the three stoppages, Mk. I V.M.G.=two mins. (Time being measured from the removal of the cloth on the first gun until the thumb-piece is pressed on the last gun).

Time allowed for three stoppages, Mk. IV V.M.G.=three mins. (Time being measured from the command "*Gun stops*" being given on the first gun until the trigger is pressed on the last gun).

Deductions for time—for every five seconds or fraction of five seconds over time deduct 1 mark. No marks are given for being under time.

For Mk. I Vickers machine-guns the crank handle will be covered until the thumb-piece has been pressed and, when uncovered, indicates that the gun has stopped firing. For Mk. IV Vickers machine-guns the crank handle will be covered with the cloth until the gunner has his eye to the telescope, after which it will be uncovered. The indication that the gun has stopped will be the command "*Gun stops.*"

Note.—A competition similar to the above can be carried out wearing gas masks in a semi-darkened room but with no time limit.

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2. *Deductions for faults in immediate action—General.*

i. Clumsy handling	deduct	2*	marks.
ii. Wrong commencement	,,	5*	,,
iii. Gun not re-loaded	,,	10*	,,
iv. Incorrect re-laying	,,	2*	,,
v. Failing to keep extractor down ...	,,	2*	,,
vi. Not depressing gib when removing round from extractor	,,	2*	,,
vii. On the command "Mount" being given for the first gun, the competitors will focus the telescope and set the range at 600 yards, and when the range is given in the fire order, set this in the telescope; for the remaining two guns the focus will be omitted, the range as given in the fire order being placed on by the instructor.			
Failing to focus telescope ...	,,	2*	,,
Not setting range correctly ...	,,	5*	,,

No. 1 Position.—

Failing to alter fuzee spring adjustment †	deduct	5	marks.
Incorrect adjustment of fuzee spring ...	,,	5	,,

No. 2 Position.—

Incorrect method of forcing crank handle back	,,	2	,,
Not examining round on extractor ...	,,	2	,,
Pulling belt unnecessarily	,,	2	,,
Using clearing plug with pin forward ...	,,	10	,,
Allowing lock to fly forward on to clearing plug	,,	2	,,
Not examining clearing plug after use (to ensure that obstruction has been removed)	,,	2	,,
Failing to knock pin of clearing plug back after use	,,	2	,,
Not returning clearing plug to its case after use	,,	2	,,
Failing to remove obstruction	,,	10	,,

* As is usual in competitions of this nature a large number of faults can be traced to nervousness. The instructor is at all times permitted to use his discretion as to the deduction of marks for the various faults on part of the gunner, whether the fault is given in these notes or otherwise.

† In the event of a competitor not altering the fuzee spring, the stoppage will be caused to recur and if the spring is then not altered, no marks will be given for that stoppage.

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No. 3 Position.—

Incorrect application of I.A. (ease, pull, tap)	deduct	5	marks.
Gun not unloaded	,,	5	,,
Failing to oil lock correctly	,,	5	,,
Not feeling pawls	,,	5	,,
Not hanging lock correctly	,,	5	,,
Failing to ease belt from feed block for bad cross feed	,,	5	,,
Failing to examine belt	,,	5	,,
Incorrect use of clearing plug when forcing extractor down	,,	2	,,
Not removing round from extractor ...	,,	5	,,
Not removing round from belt	,,	5	,,
Failing to change lock	,,	10	,,
Failing to return defective lock to case	,,	2	,,

No. 4 Position.—

Gun not unloaded	,,	5	,,
Failing to change lock	,,	10	,,
Failing to return defective lock to case	,,	2	,,

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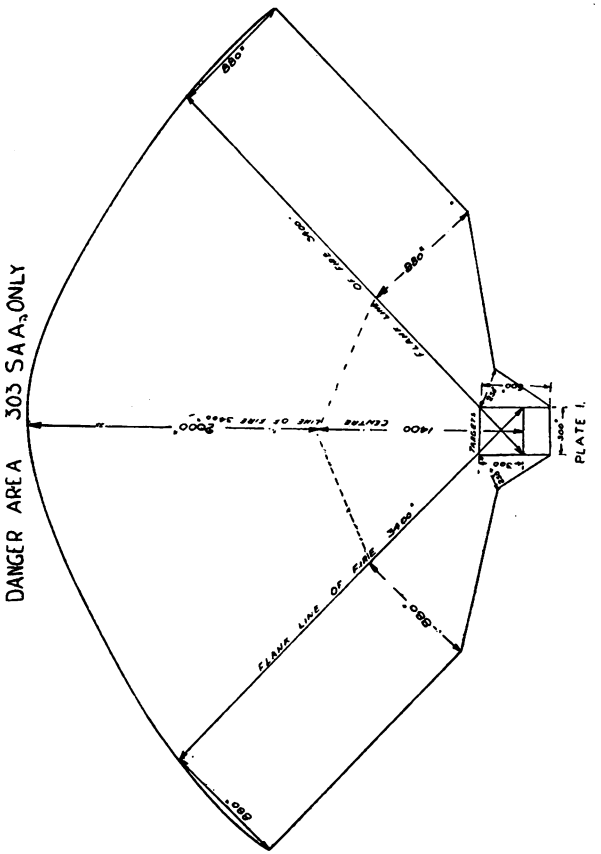
PLATE I

DANGER AREA—·303-IN. S.A.A. ONLY



Note.—The above danger area is the maximum necessary where the ground behind the targets is of a level nature. Where there is a hill background, the depth of the danger area may be reduced, but the depth should not be less than 2,500 yards behind the targets unless the hill background fulfils the conditions set out in Small Arms Training, Vol. V.

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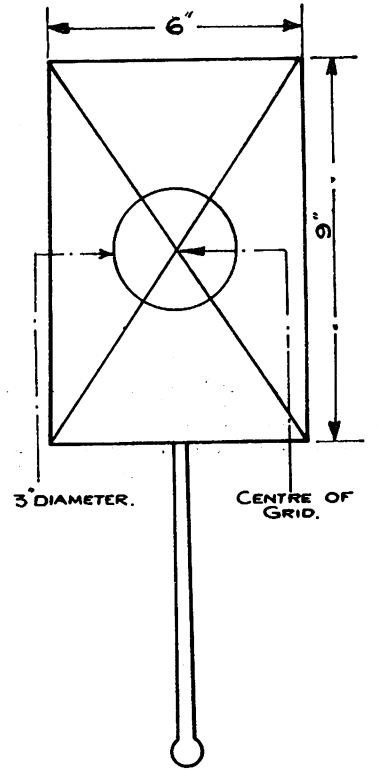
PLATE II

THE GRID

(To be constructed of $\frac{1}{8}$-in. wire)



Notes on the use of the grid.—Owing to the sighting used in firing machine-guns at a range of 30 yards, shots do not strike the point aimed at, but are registered right and plus or minus.

The relation of the M.P.I. to the point of aim should be checked by the instructor before the practices are begun and the centre of the grid should be placed on this M.P.I. The 9-inch side should be vertical, except when firing a Mark I gun from a ball mounting, when it will be horizontal.

Where there is a means of converging sights and bore at 30 yards, this should be used, and the sights should be adjusted so as to hit the exact point of aim.

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